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**FINAL**  
**FIVE-YEAR REVIEW REPORT**

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**FORT EUSTIS, VIRGINIA**

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*PREPARED FOR:*

**U.S. ARMY ENVIRONMENTAL COMMAND  
ABERDEEN PROVING GROUND, MARYLAND  
CONTRACT No. W91ZLK-05-D-0009**



*PREPARED BY:*

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701 Town Center Drive, Suite 600  
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**REVISION No.: 5  
DATE: AUGUST 28, 2008**



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

September 30, 2008

Ms. Joanna G. Bateman  
Environmental & Natural Resources Specialist  
U.S. Army Garrison  
ATTN: IMNE-EU-PW-E  
1407 Washington Boulevard  
Fort Eustis, Virginia 23604

RE: First Five-Year Review Report  
Fort Eustis, Operable Units 5 & 7  
Fort Eustis, VA

Dear Ms. Bateman:

Thank you for submitting the report, entitled *Final Five-Year Review Report*, Fort Eustis, VA, dated August 28, 2008 to the U.S. Environmental Protection Agency (EPA) for review and concurrence. The report was prepared to address the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 (c) five-year review requirements. EPA has reviewed this five-year review report and compared it to EPA's June 2001 guidance document, *Comprehensive Five Year Review Guidance* (OSWER No. 9355.7-03B-P, EPA 540-R-01-007).

EPA concurs with the Army's determination that the remedies for the DOL Storage Yard (Operable Unit 5) and Oil/Sludge Holding Pond (Operable Unit 7) are protective of human health and the environment. Furthermore, as part of this five-year review, EPA has evaluated the Government Performance and Results Act (GPRA) measures for these operable units and has determined their status is as follows:

**Environmental Indicators**

Human Health: Long-Term Human Health Protection Achieved

Groundwater Migration: Groundwater Migration Under Control

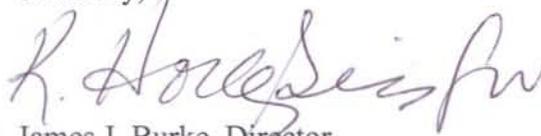
EPA understands that this Five-Year Review Report pertains to only two (2) operable units at Fort Eustis and as such, the Environmental Indicator determinations made here can differ from the status of the sitewide Environmental Indicators for Fort Eustis.

### Sitewide Ready for Anticipated Use

Operable Unit 7 was determined to be Sitewide Ready for Anticipated Use on September 25, 2008. It is anticipated that Operable Unit 5 will be determined to be Sitewide Ready for Anticipated Use on October 15, 2008.

If you have any questions, please contact Ben Mykijewycz, Chief of the NPL/BRAC Federal Facilities Branch at 215.814.3351 or Joshua Barber at (215) 814-3393.

Sincerely,

A handwritten signature in dark ink, appearing to read "J. Burke". The signature is written in a cursive style with a large, sweeping initial "J".

James J. Burke, Director  
Hazardous Site Cleanup Division

cc: Joshua Barber, EPA  
Wade Smith, VDEQ



# COMMONWEALTH of VIRGINIA

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September 30, 2008

Joanna Bateman  
Remedial Project Manager  
Fort Eustis  
U.S. Army Garrison  
IMNE-EUS-PW-E (Bateman)  
1407 Washington Boulevard  
Fort Eustis, Virginia 23604-5306

**RE: Final Five-Year Review Report  
Operable Units 5 and 7  
Fort Eustis, Virginia**

Dear Ms. Bateman:

Thank you for providing the Virginia Department of Environmental Quality's (DEQ's) Office of Remediation Programs (ORP) the opportunity to review the *Final Five-Year Review Report* (Five-Year Review) for Fort Eustis, Virginia. The August 2008 Five-Year Review, prepared by ECC and Malcolm Pirnie, Inc., was received by the DEQ on September 10, 2008.

The above-referenced Five-Year Review was reviewed by ORP staff, in accordance with the EPA's Comprehensive Five-Year Review Guidance (OSWER Directive 9355.7-03B-P), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121(c), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) §300.430(f)(4)(ii) of the Code of Federal Regulations (CFR).

This office acknowledges that all comments on previous "draft" versions of the above-referenced Five-Year Review have been adequately addressed and approves of the *Final Five-Year Review Report*, which was signed by Andrew W. Bowes (Colonel, U.S. Army Garrison Commander) on September 30, 2008. Therefore, the DEQ concurs that the selected remedies at DOL Storage Yard (Operable Unit 5) and Oil/Sludge Holding Pond (Operable Unit 7) are protective of both human health and the environment and are functioning as intended.

Please contact Wade Smith at (804) 698-4125 or [wmsmith@deq.virginia.gov](mailto:wmsmith@deq.virginia.gov) with any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Durwood H. Willis". The signature is written in a cursive style.

Durwood H. Willis, Director  
Office of Remediation Programs

cc: Milt Johnston, DEQ, TRO  
Wade Smith, DEQ, CO  
Josh Barber, EPA

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# FINAL FIVE-YEAR REVIEW REPORT

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## First Five-Year Review Report For Fort Eustis, Virginia

Revision No.: 5  
August 28, 2008

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*PREPARED FOR:*

U.S. ARMY ENVIRONMENTAL COMMAND  
ABERDEEN PROVING GROUND, MARYLAND  
CONTRACT No. W91ZLK-05-D-0009

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*PREPARED BY:*

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1125 Route 22 West  
Bridgewater, NJ 08807

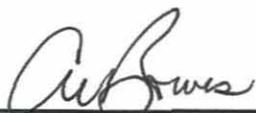


MALCOLM PIRNIE, INC.  
701 Town Center Drive, Suite 600  
Newport News, Virginia 23606



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*APPROVED BY:*

  
\_\_\_\_\_  
Andrew W. Bowes  
Colonel, U.S. Army  
Garrison Commander  
Fort Eustis

30 Sep 08  
Date

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A	Public Notifications
B	Analytical Data
C	Site Photographs
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## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site name (from WasteLAN):</b> Fort Eustis		
<b>EPA ID (from WasteLAN):</b> VA6210020321		
<b>Region:</b> 3	<b>State:</b> VA	<b>City/County:</b> Newport News
SITE STATUS		
<b>NPL status:</b> <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
<b>Remediation status</b> (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input type="checkbox"/> Complete		
<b>Multiple OUs?*</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<b>Construction completion date:</b> ___ / ___ / _____	
<b>Has site been put into reuse?</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
REVIEW STATUS		
<b>Lead agency:</b> <input type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input checked="" type="checkbox"/> Other Federal Agency <input type="checkbox"/> U.S. Army		
<b>Author name:</b> Tony Pace		
<b>Author title:</b> Associate	<b>Author affiliation:</b> Malcolm Pirnie	
<b>Review period:**</b> 09 / 13 / 2007 to 5/14/2008 <sup>1</sup>		
<b>Date(s) of site inspection:</b> 11 / 19 / 2007		
<b>Type of review:</b>		
<input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input checked="" type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
<b>Review number:</b> <input checked="" type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
<b>Triggering action:</b>		
<input checked="" type="checkbox"/> Actual RA Onsite Construction at DOL site    Actual RA Start at OU# _____ <input type="checkbox"/> Construction Completion    Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
<b>Triggering action date (from WasteLAN):</b> 12/2002		
<b>Due date (five years after triggering action date):</b> 12/2007		

\* ["OU" refers to operable unit.]

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

<sup>1</sup>The installation was scheduled to complete a Five-Year Review by the end of CY 2007; however, the EPA RPM agreed that pending the receipt of a Draft Five-Year Review Report by 12/31/2007, the installation would not be penalized.

## Five-Year Review Summary Form, cont'd.

### Issues:

The only issue noted for any of the Fort Eustis sites was continued exceedences of the long term monitoring action limits for DDT, DDE, and DDD in site soils and sediments at the DOL Storage Yard. It should be noted that remedial actions have only been completed at two Fort Eustis sites; (1) DOL Storage Yard site and (2) Oil/Sludge Holding Pond site.

### Recommendations and Follow-up Actions:

Long-term protectiveness of the remedial action at the DOL Storage Yard Site will be verified by obtaining additional soil and sediment samples at the site especially in the forested wetland area to fully assess exceedences of site action limits and overall ecological receptor health. Recommended changes to the 2008 LTM event include: deletion of PAHs from the target analyte list for sediment and soil, and termination of the groundwater component of the LTM program.

### Protectiveness Statement(s):

For the Oil/Sludge Holding Pond site, based on the extent of contaminated material removal and the LTM groundwater monitoring data, the remedy is expected to be protective of human health and the environment.

The remedy at the DOL Storage Yard Site is expected to be protective of human health and the environment. Although total DDT/DDE/DDD concentrations exceed the action limits in the forested wetland area, a significant ecological impact due to these detections is not anticipated. Long-term protectiveness of the remedial action will be verified by obtaining additional soil and sediment samples at the site especially in the forested wetland area to fully assess exceedences of site action limits and overall ecological receptor health. Additional sampling and analysis is anticipated in 2008.

### Other Comments:

Additional recommendations include the following:

1. Termination of the LTM program at the Oil/Sludge Holding Pond site due to groundwater constituent detects at levels that allow for unlimited use and unrestricted exposure.
2. Reduction in analytical parameters (deletion of PAHs) for the sediment and soil sampling component of the LTM program for the DOL Storage Yard site.
3. Termination of the groundwater monitoring component of the LTM program for the DOL Storage Yard site.

AATD	Army Aviation Applied Technology Directorate
AET	Apparent Effects Threshold
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
AWQC	Ambient Water Quality Criteria
ATSC	Army Training Support Center
BAF	Bioaccumulation Factor
BNA	Base Neutral Acid
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Constituent of Potential Concern
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DoD	Department of Defense
DPT	Direct Push Technology
ECC	Environmental Chemical Corporation
EE/CA	Engineering Evaluation/Cost Analysis
EEL	Engineering & Environment, Inc.
EPA	Environmental Protection Agency
ER,A	Environmental Risk Assessment
ERA	Environmental Restoration, Army
ERL	Effects Range – Low
ERM	Effects Range – Medium
ESD	Explanation of Significant Differences
FS	Feasibility Study
FTA	Fire Training Area
GPM	Gallons Per Minute
HDPE	High Density Polyethylene
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMA	Helicopter Maintenance Area
HQ	Hazard Quotient
IMS	Industrial Marine Service
IRA	Interim Removal Action
LEL	Lower Explosive Limit
LTM	Long Term Monitoring
MCL	Maximum Contaminant Level
MSL	Mean Sea Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priority List
NOAA	National Oceanic and Atmospheric Administration
O&M	Operation and Maintenance
OU	Operable Unit
OU-2	Operable Unit 2
OWS	Oil/Water Separator
PA	Preliminary Assessment

PAH	Polynuclear Aromatic Hydrocarbon
PBC	Performance-Based Contract
PCB	Polychlorinated Biphenyl
PEL	Probable Effect Level
PRG	Preliminary Remediation Goal
PWS	Performance Work Statement
RA	Remedial Action
RAO	Remedial Action Objective
RBC	USEPA Region III Risk Based Concentration
RACR	Remedial Action Completion Report
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RTC	Response To Comments
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SCR	Site Characterization Report
SEC	Sirrine Environmental Consultants
SquiRT	Screening Quick Reference Tables
SPSA	Southeastern Public Service Authority
SRRR	Skeet Range Response and Restoration
STP	Sewage Treatment Plant
SVE	Soil Vapor Extraction
SVOC	Semi-volatile Organic Compound
TAL	Target Analyte List
TBC	To-Be-Considered
TCL	Target Compound List
TEL	Threshold Effect Level
TFH	Total Fuel Hydrocarbons
TFH-H	Total Fuel Hydrocarbons-Heavy Fraction
TFH-L	Total Fuel Hydrocarbons-Light Fraction
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
TRC	Technical Review Committee
UCL	Upper Confidence Limits
UET	Upper Effects Threshold
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USAEHA	United States Army Environmental Health Agency
USATHAMA	United States Army Toxic and Hazardous Materials Agency
USEPA	United States Environmental Protection Agency
VDEQ	Virginia Department of Environmental Quality
VLDPE	Very Low Density Polyethylene
VOC	Volatile Organic Compound
VSWQS	Virginia Surface Water Quality Standards

The Department of the Army, in conjunction with the United States Environmental Protection Agency (EPA), Region III, and with the support of the Virginia Department of Environmental Quality (VDEQ) conducted this first Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Review in accordance with the EPA *Comprehensive Five-Year Review Guidance* (2001). This Five-Year Review document for Fort Eustis addresses remedies and remedial actions that have been implemented within all operable units (OUs) for which there is a Record of Decision (ROD) or action memorandum in place. A total of 13 OUs identified at Fort Eustis are discussed in this report, of which Final RODs exist for the following three OUs:

- **OU5** – DOL Storage Yard (FTEUST-34), Final Malcolm Pirnie ROD, September 2001
- **OU7** – Oil/Sludge Holding Pond (FTEUST-19), Final Malcolm Pirnie ROD, November 2002
- **OU2** – Brown's Lake (FTEUST-29), Final Malcolm Pirnie ROD, September 2007

The objective of this Five-Year Review is to evaluate current remedies at OU5 (DOL Storage Yard) and OU7 (Oil/Sludge Holding Pond) and to determine whether the remedies are protective of human health and the environment in accordance with the requirements set forth in their respective ROD. The principal method used to evaluate the protectiveness of the remedies was a thorough review of various reports and documents pertaining to site activities and findings. The methods, findings, and conclusions from the document reviews are presented in this Five-Year Review report. In addition, the Five-Year Review report identifies any issues that may be preventing a particular remedy from functioning as designed or as appropriate and that could endanger the protection of human health and the environment. The overall evaluation of the effectiveness of each remedy is presented as a protectiveness statement that was developed for each OU and associated sites with remedial actions (RAs).

In general, the remedial actions that have been completed for the DOL Storage Yard and Oil/Sludge Holding Pond at Fort Eustis are protective of human health and the environment. The U.S. Army is continuing CERCLA investigations of the remaining sites. The only deficiency noted is the pesticide concentrations primarily in the forested wetland area at the DOL Storage Yard site as discussed in Section 2.

This report represents the first Five-Year Review conducted at Fort Eustis. The next five-year review will be required by May 2013 (within five years of the signature date of this review).

A summary of the five-year review for both of these sites is presented below.

## **ES.1 DOL STORAGE YARD**

The OU5 ROD addressed pesticide and polynuclear aromatic hydrocarbon (PAH) contamination resulting from historical storage of pesticides and other compounds and leakage from a transformer. The remedy consisted of excavation of asphalt and contaminated subsurface soils and sediments with off site disposal and long-term monitoring (LTM). The subsurface contamination was excavated from beneath the storage yard while surface soil and sediment contamination was removed from site drainage swales, a wooded area, and a wetland area.

The LTM showed that metals in groundwater samples exceed their respective project action limits (PALs) but their concentrations were lower than the established Fort Eustis background 95<sup>th</sup> UCL concentrations indicating no additional human health risk from groundwater is attributable to contamination from the DOL Storage Yard. The LTM showed that the majority of the soil and sediment detections were less than the PALs established for the LTM program; however, several sample locations primarily in the forested wetland continue to have individual exceedences of the pesticide PALs. Based on the groundwater and soil/sediment LTM data, there does not appear to be any residual human health risk associated with site contaminants.

The remedy is expected to be protective of human health and the environment. Although total DDT/DDE/DDD concentrations exceed the action limits for ecological receptors in the forested wetland area, a significant ecological impact due to these detections is not anticipated. An ecological risk screening is anticipated to be conducted for the site as part of the 2008 LTM reporting process.

Long-term protectiveness of the remedial action will be verified by obtaining additional soil and sediment samples at the site especially in the forested wetland area to fully assess exceedences of site action limits and overall ecological receptor health. It is anticipated that the LTM program for the DOL Storage Yard will continue while the proposed recommendations included in this report are evaluated. Modifications to the LTM program, if any, will be made as a result of this evaluation.

## **ES.2 OIL/SLUDGE HOLDING POND**

The remedy selected for OU7 was the removal of contaminated soils and concrete with off-site disposal and LTM. This site served as a sludge drying bed after approximately 5,000 gallons of No. 2 fuel oil were pumped inadvertently into a sanitary sewer clean-out connection.

The LTM program showed that no PAHs and only one VOC (methylene chloride) were identified in the groundwater samples. Methylene chloride was detected in only one monitoring well (MW-127) and the concentration was below the MCL. While a number of the TAL metals (dissolved) were detected in groundwater samples, only one of the constituents (dissolved thallium)

exceeded the RGs (i.e., MCLs). The highest concentration of thallium was noted in the reference well (MW-01) indicating that the site is not the contributor for the dissolved thallium results in the area. Based on this data, there would not be any unacceptable risk associated with site groundwater.

Based on the extent of contaminated material removal and the LTM groundwater monitoring data which indicates concentrations less than the MCL for all site-related constituents, the remedy is expected to be protective of human health and the environment.

The Department of the Army, in conjunction with the United States Environmental Protection Agency (EPA), Region III, and with the support of the Virginia Department of Environmental Quality (VDEQ) conducted this first Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Review in accordance with the EPA *Comprehensive Five-Year Review Guidance* (2001). This Five-Year Review document for Fort Eustis addresses remedies and remedial actions (RA) that have been implemented within all operable units (OUs) for which there is a Record of Decision (ROD). A total of thirteen OUs have been identified at Fort Eustis, of which RODs exist for three: OU2, OU5, and, OU7,

The objective of this Five-Year Review is to evaluate the current remedies at OU5 (DOL Storage Yard) and OU7 (Oil/Sludge Holding Pond) and to determine whether the remedies are protective of human health and the environment in accordance with the requirements set forth in their respective ROD. The principal method used to evaluate the protectiveness of the remedies was a thorough review of various reports and documents pertaining to site activities and findings. The methods, findings, and conclusions from the document reviews are presented in this Five-Year Review report. In addition, the Five-Year Review report identifies any issues that may be preventing a particular remedy from functioning as designed or as appropriate and that could endanger the protection of human health and the environment.

The Environmental Chemical Corporation (ECC) is the prime contractor for United States Army Environmental Center (USAEC) for this contract. Malcolm Pirnie, Inc. prepared this report as a subcontractor to ECC. From September 2007 through February 2008 Malcolm Pirnie conducted a five-year review of the pending, completed, and on-going RAs implemented at two sites at Fort Eustis. Additionally, status updates are provided for the ten additional sites at Fort Eustis that do not require five-year reviews at this time. A general site location map is presented on **Figure 1-1**.

The Department of the Army is preparing this Five-Year Review report pursuant to CERCLA 121 and the National Contingency Plan (NCP). CERCLA Section 121 states:

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

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

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 action no less than every five years after the initiation of the selected remedial action.

This is the first five-year review of Fort Eustis. The triggering action for this review is the initiation of the RA for the DOL Storage Yard site (Operable Unit #5) which began in December 2002. Because hazardous substances remain at the site above levels that allow for unrestricted use and unlimited exposure, subsequent five-year reviews will be required.

In order to evaluate the protectiveness of the selected remedies at Fort Eustis, the technical assessment team conducted a five-year review examining the three questions shown below:

- Question 1: Is the remedy functioning as intended by the decision documents?
- Question 2: Are the assumptions used at the time of the remedy selection still valid?
- Question 3: Has any other information come to light that could call into question the protectiveness of the remedy?

To answer these questions, this five-year review required several steps including a review of documents, interviews with personnel associated with the sites, and a site inspection for each site at Fort Eustis. This report also includes the findings of a review of newly promulgated standards and changes in the standards that were identified as applicable or relevant and appropriate requirements (ARARs), to be considered (TBC) criteria, and the factors used to develop site-specific risk-based levels at the time of finalization of the ROD. This information was reviewed for sites where RODs were signed and where changes since the time of the ROD may call into question the protectiveness of the remedy. Where applicable, monitoring and sampling data and the documentation of operation and maintenance (O&M) were also examined and included in the subsequent site-specific sections.

## **1.1 OVERVIEW OF FORT EUSTIS**

### **1.1.1 Site Operable Units**

Fort Eustis has 13 OUs identified, of which two OUs have RODs in place that include a RA. **Figure 1-1** presents the locations of all OUs within the Fort Eustis' boundary.

The two OUs associated sites for which Five-Year Reviews are presented in this report are as follows:

- **OU5** – DOL Storage Yard (FTEUST-34)
- **OU7** – Oil/Sludge Holding Pond (FTEUST-19)

**Figures 2-1 and 3-1** show the locations of the sites within each OU.

One OU (Brown's Lake) has a signed ROD but a RA has yet to be implemented while 10 OUs do not yet have a selected final remedy. Interim Remedial or Removal Actions have been completed for four of these OUs (OUs 1, 2, 9, and 10). However, per the EPA *Comprehensive Five-Year Review Guidance* (2001), neither a statutory nor a policy review is required for these sites as there has been no final remedy selected or implemented for any of these OUs and Fort Eustis has not yet achieved overall site construction completion. A site status summary for 10 of these OUs is included in **Section 4**. These OUs include:

- **OU1** – Bailey Creek (FTEUST-30)
- **OU2** – Brown's Lake (FTEUST-29)
- **OU3** – Milstead Island Creek (FTEUST-27)
- **OU4** – Eustis Lake (FTEUST-36)
- **OU6** – Fire Training Area (FTEUST-06)
- **OU8** – Felker Army Airfield (FTEUST-32)
- **OU9** – Landfill No. 7 (FTEUST-04)
- **OU10** – Officer's Club Landfill No. 1 (FTEUST-01)
- **OU11** – Former Skeet and Trap Range – Upland Area (FTEUST-37)
- **OU12** – Former Skeet and Trap Range – Wetland Area (FTEUST-38)

OU13 is the 1000" Rifle Range. This site was not included in this five-year review because it was not designated as an OU at the time ECC agreed to complete the review. Both VDEQ and EPA agreed in April 2008 that this OU would be included as part of the next five-year review.

### Physical Characteristics and Land Use

Fort Eustis is the home of the U.S. Army Transportation Center, Army Transportation School, Non-Commissioned Officer Academy, Army Aviation Logistics School, 8th Transportation Brigade and 7th Sustainment Brigade. Other significant tenants include the Military Surface Deployment and Distribution Command – Operations Center, Army Training Support Center (ATSC), and the Army Aviation Applied Technology Directorate (AATD). At Fort Eustis, officers and enlisted soldiers receive education and on-the-job training in all modes of transportation, aviation maintenance, logistics and deployment doctrine and research.

Fort Eustis is located in southeastern Virginia, adjacent to the City of Newport News, Virginia. It is approximately 67 miles southeast of Richmond, Virginia on the western side of Newport News.

Fort Eustis includes an area of approximately 8,248 acres bounded to the north by Bailey Creek, Washington Boulevard and Richardson Street, and to the east and west by the Warwick and James Rivers, respectively.

The primary mission of Fort Eustis is to train personnel and units in transportation skills such as railroad, terminal service, harbor craft operations, and truck and aviation maintenance. Training facilities include a variety of classrooms, planetarium, 38 miles of railroad track, and ship and aircraft cargo loading facilities. In addition to the training facilities on the base, there are approximately 2,000 housing units, a hospital, a dental clinic, a commissary, recreation facilities, warehouses, storage areas, Felker Army Airfield and light industrial facilities that support base operations.

Approximately 10,067 military and 6,269 Department of Defense (DoD) and contractor civilians are assigned or are working at Fort Eustis. Also, approximately 3,545 military personnel and their dependents reside on Fort Eustis. Land use adjacent to the installation is residential and commercial.

### History and Site Chronology

Important Fort Eustis historical events and relevant dates in the site chronology are listed in the following table. The identified events are illustrative, not comprehensive.

Event	Date
Army purchased Mulberry Island and the surrounding acreage	1918
Camp Abraham Eustis was established as a coast artillery replacement center for Fort Monroe and a balloon observation school	1918
Became Fort Eustis and a permanent military installation	1923
Became a federal prison primarily for bootleggers	1931
Fort Eustis reopened as a military installation as the Coastal Artillery Replacement Training Center	1940
Became home to the newly-formed Transportation School	1946
The first environmental investigation was conducted by the U.S. Army Environmental Hygiene Agency. It involved the review of two sanitary landfills at Fort Eustis.	1977
The U.S. Army Toxic and Hazardous Materials Agency identified 21 potential waste sources at Fort Eustis during the Initial Assessment.	1988
Fort Eustis was included on Environmental Protection Agency's National Priorities List (NPL).	1994

Additional information on the above investigations and other studies are discussed in Sections 2 through 5, where appropriate. The following paragraphs further discuss the current state of the sites at Fort Eustis.

## **1.2 FIVE-YEAR REVIEW PROCESS**

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The Fort Eustis five-year review was led by Joanna Bateman, Fort Eustis Remedial Project Manager (RPM). The following team members assisted in the review:

- Jerry Hoover and Josh Barber, EPA Region III Project Managers
- Wade Smith, VDEQ Project Manager
- Amber Michel, Applied Services and Information Services, LLC (ASIS), Fort Eustis Restoration Program Manager
- Rob Wasserman, ECC Project Manager
- David Glass, Malcolm Pirnie Deputy Project Manager
- Tony Pace, Malcolm Pirnie Technical Lead
- Susan Herbert, Malcolm Pirnie Project Scientist

This report will be placed in the Information Repositories and Administrative Record File for Fort Eustis. Most project documentation can be found at the following Information Repository locations:

### **Grissom Library**

366 DeShazor Drive  
Newport News, Virginia 23608  
(757) 369-3190

### **Groninger Library**

Building 1313  
Fort Eustis, Virginia 23604  
(757) 878-5017

### **Christopher Newport University Library**

1 University Place  
Newport News, Virginia 23606  
(757) 594-7000

Notice of the initiation of preparation of a Five-Year Review Report for Fort Eustis was provided to the Technical Review Committee (TRC) at the October 25, 2007 meeting. A summary of the

Five-Year Review Report was presented to the TRC at the April 24, 2008 meeting. A notice of availability of the draft Five-Year Review Report was provided to the public in the Daily Press on December 23, 2007 and in The Wheel on November 29, 2007. Copies of the notices are presented in **Appendix A**.

### **1.3 REPORT ORGANIZATION**

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This report has been organized with the intent of meeting the general format requirements specified in the EPA *Comprehensive Five-Year Review Guidance* (2001) and summarizing the results of the five-year review for the sites in a comprehensive manner.

Section 1 gives an overview of Fort Eustis and the five-year review process conducted for the installation. Sections 2 and 3 present the five-year review of the sites requiring a five-year review; Section 4 presents a status update on the sites that do not currently require a five-year review; and Section 5 provides a general summary, conclusions, and protectiveness statement for Fort Eustis. This section also identifies when the next five-year review is required.

This five-year statutory review for the DOL Storage Yard site (FTEUST-34 and OU5) is being conducted because a RA has been conducted under CERCLA §121 with contaminants remaining at the site and the ROD was signed after October 17, 1986.

## **2.1 SITE HISTORY AND BACKGROUND**

Electrical transformers, other equipment and containers of pesticides products were stored in the DOL Storage Yard from 1980 to 1991. Lightning apparently struck an oil switch transformer and its contents were spilled onto the ground. An asphalt cover was constructed inside the fence line in 1997 as an interim measure to limit exposure to potential receptors in order to put the area back into use as a storage area for equipment and that is its current use. It is believed that the area beneath the asphalt cap is considered the source area of contamination at the site. Due to the uncertain historical use of the yard, specific types and quantities of chemicals used, or storage could not be established.

### **Physical Characteristics**

As shown on the site map (**Figure 2-1**), the DOL Storage Yard Site is located at the intersection of Wilson Avenue and Patch Road in the northern developed area of the base. Three storage sheds are located along the northern edge of the yard. Approximately 6,000 square feet of the western corner of the storage yard is enclosed by interior fencing.

The site is located on an upland area approximately 200 feet from wetlands situated along Milstead Island Creek. The majority of the site slopes towards the woodland and wetland areas to the west; however, the eastern edge of the site slopes toward Patch Road. A generally flat wetland area is located west of Wilson Avenue adjacent to Milstead Island Creek. Surface runoff from most of the site flows towards a drainage ditch along the western fence line of the site and subsequently discharges into a wetland area adjacent to Milstead Island Creek. However, runoff from the eastern edge of the site flows into a drainage ditch and is then transported to a storm water catch basin.

Underlying the DOL Storage Yard site are sediments of the Shirley Formation and, where present, the Moore House Member of the Yorktown Formation that form the Columbia aquifer. In general, this sedimentary sequence consists of a coarse-grained basal deposit which grades upward to fine-grained sediments with interbeds of silty sand and clayey silt. The Columbia aquifer in this area is known to have a thickness of 10 to 15 feet. Groundwater flows west-southwest and discharges to the wetland and Milstead Island Creek west of the site.

### **Site Chronology**

Important DOL site historical documents in the site chronology are listed in the following table. The identified documents are illustrative, not comprehensive.

Document Title	Date
Baker Final Site Characterization and Evaluation Report	August 1994
USAEHA Final Health Risk Assessment Report	April 1994
Malcolm Pirnie Final Remedial Investigation (RI) Report	July 2001
Malcolm Pirnie Final Feasibility Study (FS) Report	July 2001
Malcolm Pirnie Final Proposed Plan	July 2001
Malcolm Pirnie Final ROD	September 2001
Malcolm Pirnie Final Remedial Design (RD) Memorandum	August 2002
Malcolm Pirnie Final RA Report	September 2005
Malcolm Pirnie Final 2004 Long Term Monitoring (LTM) Report	May 2008
Malcolm Pirnie Draft 2005 LTM Report	September 2006
ECC/Malcolm Pirnie Draft 2007 LTM Report	March 2008

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

### Land and Resource Use

There are currently no human uses of the storage yard, wooded area or wetland area of the site. The site has historically and continues to serve as an ecosystem and watershed area for Milstead Island Creek and the James River. There are no current plans to alter the use of this site in the future.

### History of Contamination

Electrical transformers, other equipment and containers of pesticides products were stored in the DOL Storage Yard from 1980 to 1991. Lightning apparently struck an oil switch transformer and its contents were spilled onto the ground as noted in the Baker Final Site Characterization and Evaluation Report, dated August 1994. As a result of this spill, multiple site investigations including the Baker study as well as the subsequent Malcolm Pirnie Final RI Report were conducted to assess the nature of contamination. Both PCBs and extensive pesticide contamination in site soils were detected. Further investigation conducted during the Malcolm Pirnie RI field investigations did not detect PCBs in excess of EPA screening criteria. The contamination associated with the pesticides appeared to be the result of spillage from the

pesticide storage activities that took place in the storage yard.

### **Initial Response**

As noted in the Malcolm Pirnie Final RI Report, a 4-inch thick asphalt cover was constructed by Fort Eustis inside the fence line in 1997 as an interim measure to limit exposure to potential receptors in order to put the area back into use as a storage area for equipment. Based on the analytical data from Baker report, it was believed that the area beneath the asphalt cap was the source area of contamination at the site.

### **Basis for Taking Action**

A summary of the contaminants detected at the site as well as their impacts on resources is presented in the following sections.

### **Contaminant Summary**

A summary of the contaminants detected at the site is presented in the following subsections. The tables from the Malcolm Pirnie Final RI Report that present all of the contaminants detected are presented in **Appendix B**.

#### Soil

PAHs, phthalates, and metals were detected in numerous surface (0- to 6-inch depth) and subsurface soil samples upgradient, on-site and downgradient of the site. DDE and DDT were detected in the majority of soil samples collected on-site, in the drainage ditch along Patch Road, and downgradient of the site.

#### Sediment

PAHs and phthalates were detected in sediment samples in the upper portions of the drainage ditch adjacent to the site, in the ditch in the wooded area near the site, and in samples collected from the wetland area near where the ditch discharges the wetland. Pesticides were detected in all sediment samples collected at the site with DDD, DDE, and DDT being the dominant compounds detected. Numerous metals were detected in all sediment samples collected at the site. The highest concentrations were detected in the ditch along the western boundary of the fenced yard.

#### Groundwater

Chloroform and PCE were detected at locations upgradient and cross gradient from the site and therefore it was determined that their presence was most likely unrelated to activities at the site. Lindane was detected at several locations throughout the site. However, there was no clear

pattern of contamination. Several metals were also detected at the site yet no discernible distribution pattern was indicated based on the dissolved metals data

#### Surface Water

Bis(2-ethylhexyl)phthalate, DDD, DDE, and DDT were detected in one sample in the drainage ditch. Numerous metals were detected in all surface water samples.

### **Risk Assessment Summary**

#### Human Receptors

Based upon the human health risk assessment (HHRA) conclusions presented in the Malcolm Pirnie Final RI Report, it was determined that unacceptable cancer risk to current and future Fort Eustis site worker and future construction workers existed due to benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and DDT in site soils and sediment. Furthermore, unacceptable cancer and non-cancer risk to future residents (both adult and children) was present due to benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, DDE, and DDT in site soils and sediment.

#### Ecological Receptors

The results of the ecological risk assessment (ERA) presented in the Malcolm Pirnie Final RI Report showed that there was a potential risk of exposure to several pesticides (DDD, DDE, DDT) and inorganics (thallium, zinc, aluminum, chromium, lead, selenium) for mammalian and avian species. Risks were also identified for plants and invertebrates. Larger mammals using the entire area are not likely to be adversely affected. However, risks to mammalian and avian species foraging and nesting in the wetland and in the drainage ditch of the wooded area are difficult to quantify with the data available and the uncertainty associated with assessment methodology.

## **2.2 REMEDIAL ACTIONS**

Based on the results of the Malcolm Pirnie Final RI and Malcolm Pirnie Final FS Reports, dated July 2001, it was determined that a RA was necessary to address unacceptable risks from contaminated site soils and sediments. The Malcolm Pirnie Final ROD for the DOL Storage Yard site was signed on September 28, 2001. The following sections describe the Remedial Action Objectives (RAOs) and the components of the remedial alternative selected in the Malcolm Pirnie Final ROD for the DOL Storage Yard.

**Remedial Action Objectives (RAOs)**

The RAOs for the remediation of the soils and sediments in the wooded and wetland areas include the following:

- Reduce further migration of PAHs, pesticides, and metals from the DOL Storage Yard into the drainage swales, woodland area, and tidal wetland area at Fort Eustis.
- Prevent human consumption, dermal contact, or inhalation of contaminated soils and sediments that would result in a total site cancer risk in excess of  $10^{-6}$  (1 in one million) and a non-cancer risk where the hazard index is greater than 1.
- Assuming residential housing is developed in the area, reduce potential health impacts to potential future adult and child residential populations by minimizing or eliminating contact with and ingestion of surface soils within the fenced yard and soil and sediment in the drainage swales, wooded area, and wetland area.
- Reduce risk to ecological receptors exposed to surface soil and sediment in the woodland and wetland areas.
- Meet chemical specific ARARs, if they exist.
- Remediate soils and sediments in the wooded and wetland areas to an acceptable level of risk if no chemical specific ARARs exist.

**Remediation Goals to Reduce Human Health Risk**

Remediation goals (RGs) were established on the basis of the results of the baseline risk assessment and the evaluation of the expected exposures following the RA. The final RGs provided in the ROD focused upon the organic constituents (i.e., PAHs and Pesticides) as the Malcolm Pirnie Final RI Report indicates that these are the primary constituents of concern (COCs) (i.e., the largest contributors of site risk), and furthermore, the EPA indicated their desire to focus on the organic constituents in order to limit remedial impacts to the wetland areas.

The calculation of the human health RGs for site soils and sediments were based on a child exposure since they have the greatest exposure to soils as documented in the RI Report. The human health RGs were as follows:

- Benzo(a)anthracene – 750 µg/kg
- Benzo(a)pyrene – 70 µg/kg
- Benzo(b)fluoranthene – 750 µg/kg
- Benzo(k)fluoranthene – 7,460 µg/kg

- Dibenzo(a,h)anthracene – 70 µg/kg
- Indeno(1,2,3-cd)pyrene – 750 µg/kg
- DDE – 2,610 µg/kg
- DDT - 2,610 µg/kg

**Remediation Goals to Reduce Ecological Risk**

The ecological RGs established were based on the EPA Region III BTAG screening values for pesticides in soils. Pesticides were the only organics detected above ecological screening values in sediment within the wetland and woodland area. A PRG of 100 µg/kg total DDT/DDE/DDD was established for the site.

RA Components

The major components of the selected RA included the following:

- Removal of the asphalt surface and excavation of underlying impacted soils within the storage yard
- Excavation of contaminated soils and sediment from the drainage swales, wooded area, and wetland area
- Off-site transportation and disposal of asphalt and excavated soils and sediment
- Post excavation confirmation sampling and analysis
- Ground cover restoration

**Remedy Implementation**

RA field activities were conducted as planned from December 2002 (mobilization to the site) through September 2003 (installation of the paved area fence). A brief description of the RA is provided below.

The asphalt pavement located within the fenced yard was removed prior to soil excavation in that area; minimal contaminated soil was also removed during the asphalt removal process. Additional soil and sediment were removed throughout the site as part of the RA. As discussed in the RD Memorandum, the total volume of soil and sediment to be removed during the RA for the site was estimated at approximately 2,568 cubic yards. However, based on exceedences of the remediation goals in numerous locations at the 1-foot depth, additional removal was conducted. A total of approximately 3,493 cubic yards of contaminated soil and sediment were removed from the drainage swales, wooded area, forested wetland area, and paved area and disposed of off-site. Clean fill from the approved sources was then brought onto the site to refill those excavations. The paved area was backfilled and crusher run stone placed on the surface to allow for future use of the storage area by Fort Eustis.

In June 2004, Malcolm Pirnie evaluated the potential for invasive species colonization at the site. In marsh areas adjacent to the DOL site (but not impacted during RA activities), common reed (*Phragmites australis*) is the dominant vegetation; however, the DOL site has naturally revegetated itself with native species. The dense herbaceous layer combined with the canopy of pine and mixed hardwood community would make the colonization by common reed highly unlikely.

**Long Term Monitoring**

The U.S. Army initiated a LTM program at the DOL Storage Yard site post-RA in 2004. The results of the LTM program are utilized to assess the effectiveness of the RA. Annual sampling and analysis of site groundwater and sediments has been conducted since its inception in 2004. Annual reports have been submitted to EPA Region III and VDEQ for the years 2004 and 2005 data. Due to changing contracts, the LTM program was not conducted in 2006; however, two 2007 LTM events (May and November 2007) were conducted. The 2007 report was submitted to EPA Region III and VDEQ for review and comment in March 2008. The results of the LTM are discussed in Section 2.3. A summary of the annual operation and maintenance (O&M) costs is presented in the following table:

<b>LTM Year</b>	<b>Annual Costs</b>
<b>2004</b>	<b>\$33,316</b>
<b>2005</b>	<b>\$38,956</b>
<b>2007</b>	<b>\$60,226</b>

Note: 2007 included the 2006 LTM event due to delays in contracts.

**2.3 FIVE-YEAR REVIEW PROCESS**

This is the first five-year review of Fort Eustis. A discussion of additional details surrounding the five-year review process is presented in the following sections.

**Document Review**

A review of relevant documents was performed for this five-year review. The list of documents reviewed is provided in the table below

Documents	Summary of Contents Relevant to Five-Year Review
Baker Final Site Characterization and Evaluation Report, August 1994	Provides an assessment of contaminant detects (primarily pesticides in site soils) as a result of a soil sampling program, also summarizes a human health risk assessment and a removal action analysis.
USAEHA Final Health Risk Assessment Report, April 1994	Provides an assessment of potential human health risk.
Malcolm Pirnie Final RI Report, July 2001	Provides an assessment of the nature and extent of contamination, fate and transport, identification of preliminary ARARs, and risk assessment.
Malcolm Pirnie Final FS Report, July 2001	Provides additional site information as well as the establishment of the RAOs/remedial goals and the evaluation of remedial alternatives.
Malcolm Pirnie Final Proposed Plan, July 2001	Provides a summary for the site including nature and extent of contamination, risk assessment, ARARs, RAOs, remediation goals, and remedial alternatives analysis.
Malcolm Pirnie Final ROD, September 2001	Provides a summary for the site including nature and extent of contamination, risk assessment, ARARs, RAOs, remediation goals, and remedial alternatives analysis.
Malcolm Pirnie Final RA Report, September 2005	Provides a summary of the RA and any post-RA sampling and analysis.
Malcolm Pirnie LTM Report, May 2008 for Final 2004 Report, September 2006 for Draft 2005 Report, and March 2008 for Draft 2007 Report	Provides the results of the annual LTM events.

### Data Review

The LTM program's objective is to implement a sampling program that adequately covers the areas that were impacted by the COCs, and assure that the RA taken has reduced the presence of COCs to levels below the remediation goals. LTM has included analysis for certain TCL pesticides, TCL PAHs, and TAL metals. The analytical results tables for all LTM events (2004, 2005, May 2007, and November 2007) are presented in **Appendix B**.

Groundwater Monitoring

Groundwater monitoring has been conducted at the site since 1995 with the post-RA monitoring occurring since 2004. Although no contaminants were detected above primary EPA MCLs during previous investigations at the site, iron and manganese exceeded EPA RBCs and/or secondary MCLs; therefore, TAL metals analysis were the only parameters included in the groundwater monitoring portion of the LTM program.

The concentrations of four metals (antimony, iron, manganese, and vanadium) detected exceeded the action limits (EPA RBCs for tap water) established for the site monitoring program. It should be noted that the background 95<sup>th</sup> upper confidence limits (UCLs) for metals were established in Appendix I of the Malcolm Pirnie Final RI Report, dated July 2001, utilizing statistical methodologies using the background data presented in the Montgomery Watson Final Five-Site RI Report, dated February 1997. A summary of the exceedences is presented as follows:

*Antimony*

Over the four sampling event period (2004 through 2007), total antimony exceeded the EPA RBC of 1.5 µg/l in 9 of 12 samples (total analysis was not conducted during the May 2007 event) and in 7 of 16 samples for dissolved antimony. Concentrations ranged from 2.5 to 5.3 µg/l for total antimony and 3.2 to 6.3 µg/l for dissolved antimony. During this monitoring period, the EPA MCL of 6 µg/l was slightly exceeded in only one dissolved sample from monitoring well MW-11 in 2004. However, it should be noted that the antimony concentrations detected during this period were less than the background 95<sup>th</sup> UCL concentration of 250 µg/l for total and 25 µg/l for dissolved phase.

*Iron*

Over the four sampling event period (2004 through 2007), total iron exceeded the EPA RBC of 1,100 µg/l in 7 of 12 samples (total analysis was not conducted during the May 2007 event) and in 8 of 16 samples for dissolved iron. Concentrations ranged from 167 to 5,620 µg/l for total iron and 18.8 to 3,990 µg/l for dissolved iron. It should be noted that the iron concentrations detected during this monitoring period were less than the background 95<sup>th</sup> UCL concentration of 14,979 µg/l for total and 5,192 µg/l for dissolved phase.

*Manganese*

Over the four sampling event period (2004 through 2007), total manganese exceeded the EPA RBC of 73 µg/l in 5 of 12 samples (total analysis was not conducted during the May 2007 event) and in 7 of 16 samples for dissolved manganese. Concentrations ranged from 8.6 to 252 µg/l for total manganese and 8.9 to 256 µg/l for dissolved manganese. It should be noted that the

manganese concentrations detected during this monitoring period were less than the background 95<sup>th</sup> UCL concentration of 383 µg/l for total and dissolved phase.

#### *Thallium*

Over the four sampling event period (2004 through 2007), total thallium exceeded the EPA RBC of 0.26 µg/l in 0 of 12 samples (total analysis was not conducted during the May 2007 event) and in 4 of 16 samples for dissolved thallium at a concentration range of 2.1 to 3.1 µg/l. It should be noted that the thallium concentrations detected during this monitoring period were less than the background 95<sup>th</sup> UCL concentration of 5 µg/l for dissolved phase.

#### *Vanadium*

Over the four sampling event period (2004 through 2007), total vanadium exceeded the EPA RBC of 1.1 µg/l in 4 of 12 samples (total analysis was not conducted during the May 2007 event) and in 0 of 16 samples for dissolved vanadium. Concentrations ranged from 0.42 to 5.6 µg/l for total vanadium and 0.44 to 0.65 µg/l for dissolved vanadium. It should be noted that the vanadium concentrations detected during this monitoring period were less than the background 95<sup>th</sup> UCL concentration of 15 µg/l for total and 5 µg/l for dissolved phase.

#### Sediment and Soil Monitoring

Sediment and soil sampling and analysis have been conducted at the site since 1995 with the post-RA monitoring occurring since 2004. The COCs identified during the RI and documented in the ROD included certain pesticides (DDT, DDE, and DDT) and certain PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene).

The concentrations of these pesticides and several PAHs detected exceeded the action limits established for the site monitoring program. A summary of the exceedences is presented as follows:

#### *Pesticides*

2004 - The pesticide COCs were detected in all 10 soil and sediment samples collected during the monitoring event. DDD was detected in 7 of 10 samples at a range of 0.52 to 23 µg/kg while DDE was detected in 10 of 10 samples at a range of 0.47 to 13 µg/kg and DDT was detected in 7 of 10 samples at a range of 1.5 to 150 µg/kg. Only one pesticide COC (DDT) exceeded the project action limit of 100 µg/kg and in only one sample, SW1-1 (150 µg/kg), which is located in the swale adjacent to Patch Road.

2005 - The pesticide COCs were detected in all 10 soil and sediment samples collected during the 2005 LTM event. DDD was detected in 9 of 10 samples at a range of 2.4 to 79 µg/kg, DDE was detected in 10 of 10 samples at a range of 0.79 to 140 µg/kg, and DDT was detected in 9 of 10 samples at a range of 1.7 to 83 µg/kg. Only one pesticide COC (DDE) exceeded the action limit of 100 µg/kg and in only one sample, FWET-1 (140 µg/kg), which is located in the wooded wetland area.

May 2007 - The pesticide COCs were detected in all 18 soil and sediment samples collected during the monitoring event. DDD was detected in 16 of 18 samples at a range of 0.99 to 76 µg/kg, DDE was detected in 18 of 18 samples at a range of 1.7 to 400 µg/kg, and DDT was detected in 18 of 18 samples at a range of 1.9 to 930 µg/kg. Only 5 of 18 samples exceeded the 100 µg/kg action limit for total DDT/DDE/DDD including two in the forested wetland area (FWET-5 and FWET-8), two in drainage swale #3 (SW3-1 and SW3-2), and one in drainage swale #4 (SW4-1). Because of the total DDT/DDE/DDD detect of 1,406 µg/kg detect at sample location SW3-2 located within Swale #3 that runs adjacent to Wilson Avenue, several re-samples were taken upstream and downstream of that location in June 2007 to assess the magnitude of contamination. During the site reconnaissance for the re-sample, it was noted that the SW3-2 sample was taken along the edge of the roadway instead of within the swale. The re-sample concentrations were 20 µg/kg for DDD, 38 µg/kg for DDE, and 38 µg/kg for DDT at this location. The upstream sample, SW3-1, had a total DDT/DDE/DDD concentration of 210 µg/kg in the first sample and 20 µg/kg in the re-sample.

Nov 2007 - The pesticide COCs were detected in all 18 soil and sediment samples collected during the monitoring event. DDD was detected in 16 of 18 samples at a range of 2.3 to 31 µg/kg, DDE was detected in 16 of 18 samples at a range of 2.7 to 110 µg/kg, and DDT was detected in 18 of 18 samples at a range of 2.2 to 230 µg/kg. Only 5 of 18 samples exceeded the 100 µg/kg action limit for total DDT/DDE/DDD including three in the forested wetland area (FWET-7, FWET-8, and FWET-10), one in drainage swale #1 (SW1-2), and one in drainage swale #4 (SW4-1).

#### *PAHs*

2004 - The PAH COCs were detected in only 1 of 10 soil and sediment samples collected during the monitoring event. Benzo(a)anthracene (48 µg/kg), benzo(a)pyrene (41 µg/kg), benzo(b)fluoranthene (44 µg/kg), benzo(k)fluoranthene (51 µg/kg), and indeno(1,2,3-cd)pyrene (40 µg/kg) were detected in sample SW3-2 which is located within Swale #3 near the culvert that runs under Wilson Avenue. These concentrations were less than the action limits for the monitoring event.

2005 - The PAH COCs were detected in 4 of 10 soil and sediment samples collected during the 2005 LTM event. Benzo(a)anthracene (33 and 93 µg/kg), benzo(a)pyrene (29 to 98 µg/kg), benzo(b)fluoranthene (93 µg/kg), benzo(k)fluoranthene (40 to 110 µg/kg), and indeno(1,2,3-

cd)pyrene (26 to 82 µg/kg) were detected at the site. Only one PAH COC (benzo(s)pyrene at 98 µg/kg) exceeded the action limit of 70 µg/kg and in only one sample, FWET-1, which is located in the wooded wetland area.

May 2007 - The PAH COCs were detected in 4 of 10 soil and sediment samples collected during the May 2007 LTM event. Benzo(a)anthracene (81 to 130 µg/kg), benzo(a)pyrene (87 to 130 µg/kg), benzo(b)fluoranthene (87 to 170 µg/kg), benzo(k)fluoranthene (100 to 170 µg/kg), and indeno(1,2,3-cd)pyrene (40 to 82 µg/kg) were detected at the site. Only one PAH COC (benzo(a)pyrene) exceeded its respective action limit in 5 of 10 samples.

Nov 2007 - The PAH COCs were detected in 4 of 18 soil and sediment samples collected during the Nov 2007 LTM event. Benzo(a)anthracene (90 to 2,700 µg/kg), benzo(a)pyrene (120 to 2,000 µg/kg), benzo(b)fluoranthene (2,600 µg/kg), benzo(k)fluoranthene (80 to 1,800 µg/kg), dibenz(a,h)anthracene (400 µg/kg) and indeno(1,2,3-cd)pyrene (1,100 µg/kg) were detected at the site. Only one PAH COC (benzo(a)pyrene) exceeded its respective action limit in 2 of 18 samples.

### Site Inspection

A site inspection was conducted on November 19, 2007 by Joanna Bateman (Fort Eustis RPM), Fran Coulters (USAEC), Amber Michel (ASIS Fort Eustis Restoration Program Manager), Dave Glass (Malcolm Pirnie), Susan Herbert (Malcolm Pirnie), Rob Wasserman (ECC), Jerry Hoover (EPA Region III), and Wade Smith (VDEQ). The purpose of the site inspection for the DOL Storage Yard site was to assess the protectiveness of the remedy through observation of site conditions including wetland conditions and any erosion issues. No significant issues were identified during the site inspection. No erosion problems were noted for clean fill placed at the site within the fenced area, drainage swales, and forested wetland area. Stormwater flow patterns appeared consistent with pre-RA activities.

Photographs from the site inspection are presented in **Appendix C**. A copy of the site inspection checklist is included in **Appendix D**.

### Community Involvement

Activities to involve the community in the Five-Year Review were initiated during a meeting of the Ft. Eustis Technical Review Committee (TRC) on October 25, 2007. It was at this time that the TRC was notified of the initial preparations to conduct the Five-Year Review. A summary of the Five-Year Review Report was presented to the TRC at the April 24, 2008 meeting. Additionally, a notice of availability of the draft Five-Year Review Report was provided to the public in the Daily Press on December 23, 2007 and in The Wheel on November 29, 2007. Copies of the notices are presented in **Appendix A**.

## 2.4 TECHNICAL ASSESSMENT

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

The review of documents, RAOs, ARARs, risk assumptions, monitoring results, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD. The site inspections did not identify any problems or disturbances of the clean fill, crushed stone or vegetation.

The LTM showed that for groundwater three metals (antimony, iron, and manganese) were detected above their respective PALs in May 2007 and four metals (antimony, arsenic, iron, and manganese) exceeded their respective PALs in the groundwater samples collected in November 2007; however, all of the concentrations were lower than the established Fort Eustis background 95<sup>th</sup> UCL concentrations. There has been little variation in metal concentrations in groundwater for the four LTM events.

The LTM showed that the majority of the soil and sediment detections were less than the PALs established for the LTM program. For pesticide COCs, significant detections from the May 2007 data include three samples that exceeded the 100 µg/kg PAL for total DDT/DDE/DDD: FWET-1 dup, FWET-5, and FWET-8. Significant detections from the November 2007 data include five samples that exceeded the 100 µg/kg PAL for total DDT/DDE/DDD: FWET-7, FWET-8, FWET-10, SW1-2, and SW4-1. There does not appear to be a clear trend for annual maximum pesticide COC concentration (146 to 302 µg/L). The annual median appears to be increasing over time (4 to 63 µg/L), but is still below the project action limit (PAL). Although there does not appear to be a clear trend for the 95<sup>th</sup> percentile upper confidence limit (UCL) pesticide COC concentrations, the values remain within a fairly narrow range (between 88 to 126 µg/L). The 95% UCL for the November 2007 dataset is less than the PAL.

Although a few individual PAHs have been detected, only one PAH (benzo(a)pyrene) in only 2 of 18 samples exceeded its respective action limit during the November 2007 monitoring event and in 8 of 48 samples during the entire LTM period (2004 – 2007). Its 95<sup>th</sup> percentile UCL for the November 2007 event is 45 µg/kg, which is below the 70 µg/kg action limit indicating risk lower than the 10<sup>-6</sup> criterion. None of the pesticide detects exceed human health risk screening criteria (EPA risk-based concentrations for residential soils). Based on the groundwater and soil/sediment LTM data, there does not appear to be any residual human health risk associated with site contaminants.

Although total DDD/DDE/DDT detects continue to exceed the PAL, significant ecological impact of the pesticide detections is not anticipated because of the following:

- This forested wetland area is not located within designated critical habitat for any protected species.

- Although some impacts to individual receptors or local invertebrates and plants are possible, the potentially impacted area is of such small acreage that minimal impacts to upper-trophic populations would be expected.
- Because of the small area with detects above the action limit, there is ample habitat at Fort Eustis surrounding this area to maintain a healthy, diverse ecosystem.

#### System Operations/Operation and Maintenance (O&M)/Monitoring Activities

The only O&M conducted at the site is the annual LTM program which includes the sampling and analysis of soils, sediment, and groundwater. Based on a review of the LTM program, the scope of the program and the data being collected appears sufficient to evaluate the effectiveness of the remedy. The LTM program includes the collection and analysis of samples throughout the site focusing on those areas previously contaminated prior to the RA and on those areas where migration from the site downstream/downgradient is possible.

#### Opportunities for Optimization

It is recommended that the groundwater monitoring component of the LTM program be discontinued. Results from the LTM program (four events from 2004 through 2007) indicated a one time exceedance (in 2004) of the respective EPA risk-based concentrations (RBCs) for tap water for four dissolved metals (antimony, iron, manganese, and thallium). In addition, only antimony exceeded its EPA MCL at that time. The concentrations of these metals were below the approved Fort Eustis background 95<sup>th</sup> UCLs. Because of the low concentrations detected at naturally occurring levels, the groundwater monitoring program should be discontinued.

The sediment and soil monitoring component of the LTM should be modified to only include DDT, DDE, and DDD analysis. Because PAHs have been detected during four LTM events in various areas of the site with minimal exceedences of the benzo(a)pyrene action limit, the RAO (utilizing the 95<sup>th</sup> UCL concentrations) has been met which states that the human health risk should be maintained less than the 10<sup>-6</sup> criterion. Benzo(a)pyrene's 95<sup>th</sup> percentile UCL for the November 2007 event is 45 µg/kg, which is below the 70 µg/kg action limit indicating risk lower than the 10<sup>-6</sup> criterion because the 70 µg/kg action limit equates to 10<sup>-6</sup> risk level. No additional data is necessary.

#### Early Indicators of Potential Remedy Problems

The only indicators of potential remedy problems include the DDT, DDE, and DDD concentrations detected in the LTM program, which are primarily those locations in the forested wetland area. As noted above, individual pesticides UCLs for the wetland area are 26 µg/kg for DDD, 104 µg/kg for DDE, and 159 µg/kg for DDT. The highest concentrations of these

pesticides were detected in 2007 in areas that were not originally removed as part of the RA. In 2005, a forested wetland sample (FWET-1) had a total DDT/DDE/DDD concentration greater than the 100 µg/kg action limit; therefore, additional sampling locations in the forested wetland area outside of the original RA area were collected in May and November 2007 to assess the migration location for these pesticides. In May 2007, only 2 of 10 wetland samples exceeded the action limit while 3 of 10 exceeding the action limit during the November 2007 sampling event. Although exceedences of the action limit have occurred, the potential impacted area is a small area within the forested wetland area.

At this time, no additional action appears warranted other than the continuation of sediment sampling in this area with pesticide analysis. A significant ecological impact of the pesticide detections is not anticipated because of the following:

- This forested wetland area is not located within designated critical habitat for any protected species.
- Although some impacts to individual receptors or local invertebrates and plants are possible, the potentially impacted area is of such small acreage that minimal impacts to upper-trophic populations would be expected.
- Because of the small area with detects above the action limit, there is ample habitat at Fort Eustis surrounding this area to maintain a healthy, diverse ecosystem.

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

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered

As the remedial work has been completed at the site, most PRGs and action limits for soil and sediment contaminants cited in the ROD have been met. As noted above, some pesticide concentrations continue to exceed the establish action limits. There have been no changes in these standards in that the risk assumptions used to calculate them have not significantly changed.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the human health risk assessment included both current exposures (site and construction workers), likely potential future exposures (site and construction workers), and unlikely potential future exposures (adult and child residents). There

have been no changes in the toxicity factors for the COCs that were used in the baseline human health risk assessment (HHRA). These assumptions are considered to be conservative and reasonable in evaluating risk and developing the risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. The ecological PRGs established were based on the EPA Region III BTAG screening values for pesticides in soils. No changes in these screening values for soils have been noted.

There also have been no changes to the standardized HHRA and ERA methodologies that could affect the protectiveness of the remedy.

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

Other than information discussed for Questions A and B, there is no other information that calls into question the protectiveness of the remedy.

**Technical Assessment Summary**

According to the data reviewed and the site inspection, the remedy is generally functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. Most COC action limits have been met except for several pesticide concentrations in the forested wetland area. There have been no changes in the exposure assumptions and toxicity factors that were used in the baseline HHRA and ERA that would affect the protectiveness of the remedy.

**2.5 ISSUES**

The following table identifies any issues associated with the remedy and whether it currently or in the future affects the protectiveness of the remedy.

Issue	Currently Affects Protectiveness (Yes/No)	Affects Future Protectiveness (Yes/No)
Pesticide action limits may not be achieved	No	No

## 2.6 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Current/Future)	
Pesticide action limits may not be achieved	Continued sediment and soil monitoring in forested wetland area as well as a comprehensive ecological screening as part of the 2008 LTM event to evaluate the current the ecological risk associated with the pesticide contamination.	U.S. Army	VDEQ/EPA	12/30/08	No	No

Additional recommendations which were not associated with the issue listed in the tables above include the following:

- Termination of the groundwater monitoring component of the LTM program. It was originally included because of iron and manganese exceedences of the EPA RBCs. During the breadth of the monitoring program (four events from 2004 through 2007), four dissolved metals exceeded their respective EPA RBCs for tap water. These metals included antimony, iron, manganese, and thallium with only one (antimony in one well during 2004) exceeding the EPA MCL. The concentrations of these metals were below the Fort Eustis background 95<sup>th</sup> UCL. Because of the low concentrations detected at naturally occurring levels, the groundwater monitoring program should be discontinued.
- Reduction in analytical parameters for the soil and sediment sampling component of the LTM program. The sediment and soil monitoring component of the LTM should be modified to only include DDT, DDE, and DDD analysis. Because PAHs have been detected during four LTM events in various areas of the site with minimal exceedences of the benzo(a)pyrene action limit, the RAO (utilizing the 95<sup>th</sup> UCL concentrations) has been met which states that the human health risk should be maintained less than the 10<sup>-6</sup> criterion. Benzo(a)pyrene's 95<sup>th</sup> percentile UCL for the November 2007 event is 45 µg/kg, which is below the 70 µg/kg action limit indicating risk lower than the 10<sup>-6</sup> criterion because the 70 µg/kg action limit equates to 10<sup>-6</sup> risk level.

## 2.7 PROTECTIVENESS STATEMENT

The remedy is expected to be protective of human health and the environment. Although total DDT/DDE/DDD concentrations exceed the action limits in the forested wetland area, the overall potential ecological risk was significantly reduced as a result of the remedial action. A significant

ecological impact due to these subsequent detections is not anticipated because of the following:

- This forested wetland area is not located within designated critical habitat for any protected species.
- Although some impacts to individual receptors or local invertebrates and plants are possible, the potentially impacted area is of such small acreage that minimal impacts to upper-trophic populations would be expected.
- Because of the small area with detects above the action limit, there is ample habitat at Fort Eustis surrounding this area to maintain a healthy, diverse ecosystem.

An ecological risk screening is anticipated to be conducted for the site as part of the 2008 LTM reporting process.

Long-term protectiveness of the RA will be evaluated by obtaining additional soil and sediment samples at the site especially in the forested wetland area to fully assess exceedences of site action limits and overall ecological receptor health. It is anticipated that the LTM program for the DOL Storage Yard will continue while the proposed recommendations included in this report are evaluated. Modifications to the LTM program, if any, will be made as a result of this evaluation.

This remedy did not result in hazardous substances, pollutants, or contaminants remaining at the Oil/Sludge Holding Pond site (FTEUST-19 and OU #7) above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory five-year review is not required for this site. However, EPA Region III has requested a discretionary review of the selected remedy at the Oil/Sludge Holding Pond in order to assess its effectiveness.

### **3.1 SITE HISTORY AND BACKGROUND**

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The Oil/Sludge Pond was originally an unlined pond intended to contain rainwater runoff. In 1979, approximately 5,000 gallons of No. 2 fuel oil were pumped inadvertently into a sanitary sewer clean-out connection. At the sanitary sewage treatment plant, the fuel was diverted to a sludge drying bed. The sludge, which consisted of a mixture of oil, digested sewage and fuel residues, was then disposed of in the storm water holding pond and covered with 8 to 10 feet of earthen fill. The volume of sludge was estimated to be roughly 165 cubic yards, of which the fuel oil comprised approximately 15 percent by volume (as indicated in the Final Montgomery Watson RI Report, dated February 1997, intrusive investigations were able to delineate approximately 20 cubic yards of oil sludge material).

#### **Physical Characteristics**

As shown on **Figure 1-1**, the site is near the intersection of Mulberry Island Road and Back River Road in the Mulberry Island section of the installation. A site map presenting site features is provided as **Figure 3-1**.

The site is an approximately .9 acre grassy field located 300 feet north of the intersection of Back River Road and Mulberry Island Road. The site is situated in an area of gently sloping topography trending towards a flatter area to the south and east. Surface runoff drains across the site from the north towards an intermittent stream located at the base of the topographic relief. This stream flows to the east towards Mulberry Island Road.

Due to the change in topography and the fill material deposits at the site, the underlying lithologies are varied across the Oil/Sludge Holding Pond Site. Portions of the site are underlain by stiff, plastic clays at least to a depth of 20 feet. Underlying the adjacent areas to the south and east of the pond, the lithology consists of interbedded silty clays, silty sands and sandy clays. To the north of the site, the lithology is comprised of medium grained sand to a depth of approximately 7 feet that, in turn, is underlain by sandy silt to a depth of 16 feet. The upper portion of the Yorktown Formation marks the base of the water table aquifer in the region. Sediments characteristic of the Yorktown Formation were not encountered in the borings installed at the site.

Groundwater flow is to the south-southwest in the direction of the surface slope.

**Site Chronology**

Important Oil/Sludge Holding Pond site historical events and relevant dates in the site chronology are listed in the following table. The identified events are illustrative, not comprehensive.

<b>Document Title</b>	<b>Date</b>
Weston Final Preliminary Assessment (PA) Report for Fort Eustis	November 1990
Montgomery Watson Final Five-Site RI Report	February 1997
Malcolm Pirnie Final FS Report	October 2001
Malcolm Pirnie Final Proposed Plan	November 2001
Malcolm Pirnie Final ROD	November 2002
Malcolm Pirnie Explanation of Significant Differences	September 2004
Malcolm Pirnie Final RA Report	September 2006
Malcolm Pirnie Final 2006 LTM Report	September 2008
Malcolm Pirnie Final 2007 LTM Report	July 2008

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

**Land and Resource Use**

At present, the site is an unused, forested area covered with vegetation. Land usage of the post in the vicinity of the site would best be described as industrial and a dredge spoils stockpile is located adjacent to the site. At present, the site is located on a U.S. Army Post, and while the installation has residential dwellings, these areas are a significant distance from the site (the nearest dwellings are approximately 6,000 feet east of the site). Furthermore; therefore, no trespassers have been noted in this area. There are no current plans to alter the use of this site in the future.

**History of Contamination**

The Oil/Sludge Holding Pond was originally an unlined pond intended to contain rainwater runoff. In 1979, approximately 5,000 gallons of No. 2 fuel oil were pumped inadvertently into a sanitary sewer clean-out connection. At the sanitary sewage treatment plant, the fuel was diverted to a sludge drying bed. The sludge, which consisted of a mixture of oil, digested sewage and fuel

residues, was then disposed of in the storm water holding pond and covered with 8 to 10 feet of earthen fill. The volume of sludge was estimated to be roughly 165 cubic yards, of which the fuel oil comprised approximately 15 percent by volume (as indicated in the Montgomery Watson Final RI Report, dated February 1997, intrusive investigations were able to delineate approximately 20 cubic yards of oil sludge material).

As part of the Montgomery Watson RI, a field investigation was conducted at the site in 1990 to determine the location of the buried Oil/Sludge Holding Pond and to evaluate the extent of soil and groundwater contamination at the site; however, Fort Eustis had been aware of the presence of the petroleum-contaminated sludge materials at this location since its disposal there in 1979. Results of this investigation are provided in the Contaminant Summary section below.

### Initial Response

Other than initiating a characterization of the site in 1990, no initial responses (e.g., removal action) were conducted because the sludge material had been capped with soil when it was placed at its location in 1979.

### Basis for Taking Action

A summary of the contaminants detected at the site, as well as their impacts on resources, is presented in the following sections.

### Contaminant Summary

A summary of the contaminants detected at the site is presented in the following subsections. The tables from the Final Montgomery Watson RI Report that present all of the contaminants detected are presented in **Appendix B**.

Based on the 1990, 1993, and 1994 data presented in the Montgomery Watson Final RI Report, contamination present at the Oil/Sludge Holding Pond site is localized. Fuel-related VOCs, BNAs, and TFH-H were detected in soil and groundwater samples collected near the buried holding pond. Soil samples collected downgradient of the buried holding pond were not contaminated. Low levels of VOCs were detected in the groundwater sample collected at this location (MW127), with only benzene slightly exceeding its MCL in one 1990 sample. Two sediment sample collected from the drainage channel contained toluene at concentrations of 26 and 7.4 µg/kg. The source of this sediment contamination is not clear.

The 1994 CPT investigation performed as part of the Montgomery Watson RI accurately delineated the buried holding pond. Data indicated that the buried holding pond was not significantly impacting the surrounding area. Based upon the historical investigations performed

at the Oil/Sludge Holding Pond site it was concluded that:

- The buried oil/sludge holding pond had been completely delineated, both vertically and horizontally.
- Contamination existed at low concentrations and was limited to the soil and groundwater near the buried holding pond.
- As presented in the Montgomery Watson Final 5-site RI Report, the volume of oil sludge was approximately 20 cubic yards based on the CPT investigation data.

Benzene was not detected in groundwater samples from the site during a July 2001 Groundwater Monitoring Event performed by Malcolm Pirnie. Given the impermeable nature of the site soils and the singular detection of benzene above its MCL in 1990, it was concluded that additional leaching to groundwater was not anticipated.

### **Risk Assessment Summary**

#### Human Receptors

Based on the results of the HHRA in the Montgomery Watson Final RI Report, potential human receptors at the site would be limited to groundskeepers maintaining the roadside vegetation bordering the site, possible infrequent passers-by, potential remediation personnel for the current situation, and residential exposure as a possible future land use scenario. The concentrations detected in the various environmental media do not indicate that a human health problem exists. However, if the sludge material were brought to the surface, by processes such as excavation or grading, potential exposures may exist due to unacceptable risk associated with aluminum, arsenic, beryllium, chromium, iron, lead, manganese, mercury, silver, and vanadium.

#### Ecological Receptors

The results of the ERA presented in the Montgomery Watson Final RI Report concluded that exposure to subsurface soils and buried sludge by various ecological receptors was not anticipated at that time nor was it considered likely in the future. This was based on continued land use control so that the buried sludge would not become available for contact with ecological receptors. Furthermore it was important to take into consideration the fact that the Oil/Sludge Holding Pond includes a very limited areal extent, which diminishes the potential for significant adverse biological effects.

## **3.2 REMEDIAL ACTIONS**

Based on the results of the Montgomery Watson Final RI Report and Malcolm Pirnie FS Report, it was determined that a remedial action was necessary for site soils and buried sludge

materials. The Malcolm Pirnie Final ROD for the Oil/Sludge Holding Pond site was signed on October 29, 2002 and the Malcolm Pirnie Final Explanation of Significant Differences (ESD) Report was signed on September 29, 2004. The following sections describe the rationale for Malcolm Pirnie Final ESD, the RAOs, and the components of the remedial alternative selected in the Malcolm Pirnie Final ROD for the Oil/Sludge Holding Pond.

### **Remedy Selection**

The Malcolm Pirnie Final ROD was originally signed on October 29, 2002, and in general, specified the excavation and off-site disposal of the sludge materials buried at the site; however, upon implementation of the oil/sludge removal during the initial RA as described below, it was discovered that the total volume of buried oil/sludge material significantly exceeded initial estimates provided in the Montgomery Watson Final RI Report, and that in some instances the material was intermixed with concrete. As a result, the excavation of additional oil/sludge material, in accordance with the selected remedy specified in the ROD, formed the basis of the Malcolm Pirnie Final ESD which was prepared due to additional volumes anticipated during the RA. No other RA changes were noted.

### **Remedial Action Objectives**

The RAOs for the remediation of soil at the Oil/Sludge Holding Pond include the following:

- Minimize the potential for human ingestion or dermal contact with contaminated soil at the site.
- Minimize the potential for exposure to possible ecological receptors such as birds and other wildlife to contaminated soil and groundwater at the site.
- Meet chemical, location, and action specific ARARs.
- Minimize the potential for interaction between buried sludges on-site and possible dredge spoils area expansion.

### **Remediation Goals to Reduce Human Health Risk**

As a conservative approach to establish cleanup goals, remediation Goals (RGs) have been developed using the residential land use scenario with exposure to children anticipated and were established in the Malcolm Pirnie Final ROD.

### Soils

A summary of the risk assessment conducted during the Montgomery Watson Final RI Report, as well as EPA Region III comments to that report, indicates that the COCs for the site soils includes aluminum, arsenic, beryllium, chromium, iron, lead, manganese, mercury, silver, and

vanadium. The greater value between the statistical background concentration UCLs, ARARs, and calculated risk-based concentration was chosen as the final RG for each COC. The risk-based, ARAR-based, and statistical background-based concentrations considered as potential RGs, as well as the final selected RGs for soils, are summarized in the following table.

COPC	Risk-based Concentration (mg/kg)		ARAR-Based Concentration (mg/kg)	Statistical Background-based Concentration (mg/kg)	Final RG (mg/kg)
	HQ = 1	10 <sup>-6</sup>			
Aluminum	64,640	---	---	24,300	64,640
Arsenic	20	0.52 <sup>1</sup>	---	16.9	16.9
Beryllium	50	---	---	0.315	50
Chromium	57,230	---	---	26.8	57,230
Iron	20,583	---	---	17,000	20,583
Lead	---	---	400 <sup>2</sup>	13.5	400
Manganese	1,180	---	---	95.3	1,180
Mercury	---	---	---	0.048	0.048
Silver	350	---	---	---	350
Vanadium	495	---	---	60	495

## Notes:

- (1) Of the two potential risk-based concentrations for arsenic, the lowest concentration has preference; however, the statistical background concentration is greater than the risk-based concentration and therefore has priority as the risk-based concentration.
- (2) Lead PRG based on January 2001 guidance "EPA Standards for Lead in Soil" for children exposed to bare soil.

Groundwater

The only contaminant detected in groundwater at the site above EPA MCLs was benzene which was detected in one well (MW127) in 1990 at a concentration of 5.6 µg/l. However, it was not detected in the same well during a 1993 sampling event or in any other well during a July 2001 sampling event. Based upon this data, no remedial action was required for groundwater at the site. Nevertheless, for the purposes of any monitoring that proposed alternatives may incorporate, the PRG for benzene was established at the EPA MCL of 5 µg/l.

**Remediation Goals to Reduce Ecological Risk**

Given the lack of existing environmental risks at the site, the remediation goals to reduce ecological risk at the site are qualitative and provided as follows:

- Control migration of contaminants present in the buried oil/sludge to groundwater, surface water, or surface soils at the site.

- Minimize the potential for exposure to possible environmental receptors such as birds and other wildlife.

### **RA Components**

The major components of the selected remedial action included the following:

- Implementation of various controls including dust control, as well as erosion and sediment control;
- Excavation of contaminated soils and concrete;
- Off-site transportation and disposal excavated soils and concrete;
- Post-excavation confirmation sampling; and
- Ground cover restoration.

### **Remedy Implementation**

RA field activities were conducted by ASIS (formerly Engineering and Environment [EEI]) from January 2004 (mobilization to the site) through June 2004 (site seeding and equipment demobilization). A detailed description of the RA is provided below.

Soil and sludge material were excavated from the site as planned; however, the contractor found a layer of concrete debris, which was not expected. Furthermore, they found that the buried sludge material was not as laterally confined and consisted of a much thinner layer than was expected. Given this change in site conditions and contract limitations, excavation activities ceased not pursuing the full extent of oil/sludge material until additional investigation could be conducted.

As a result of the discovery of more sludge and contaminated concrete than planned, the excavation was temporarily backfilled with clean soil material. An additional field investigation was conducted in January 2004 to further delineate the extent of the concrete and underlying sludge material. An ESD was prepared by Malcolm Pirnie to modify the ROD to account for the additional area of sludge material that required excavation and removal from the site. Sludge material, soil, and concrete debris were removed throughout the site as part of the RA. The total weight of soil, concrete and oil/sludge to be removed during the May 2004 portion of the RA for the site was approximately 731 tons. Upon approval from Fort Eustis, ASIS backfilled the excavation at the site and regraded and graveled the berm access road. The site was seeded with local species of grasses, and the equipment was demobilized by June 30, 2004.

**LTM Program**

The U.S. Army initiated an LTM program at the Oil/Sludge Holding Pond site post-RA in 2006. The Final LTM Plan was prepared by Malcolm Pirnie in January 2006. The results of the LTM program are utilized to assess the effectiveness of the remedial action. Annual sampling and analysis of site groundwater has been conducted since its inception in 2006. The results of the LTM are discussed in Section 3.4. A summary of the annual operation and maintenance (O&M) costs is presented in the following table:

LTM Year	Annual Costs
2006	\$23,972
2007	\$27,000

**3.3 FIVE-YEAR REVIEW PROCESS**

This is the first five-year review of Fort Eustis. A discussion of additional details surrounding the five-year review process is presented in the following sections.

**Document and Data Review****Document Review**

A review of relevant documents was performed for this five-year review. The list of documents reviewed is provided in the table below:

Documents	Summary of Contents Relevant to Five-Year Review
Montgomery Watson Final 5-Site RI Report, February 1997	Provides an assessment of the nature and extent of contamination, fate and transport, and risk assessment.
Malcolm Pirnie Final FS Report, October 2001	Provides the RAOs, ARARs, remediation goals, and evaluation of remedial alternatives.
Malcolm Pirnie Final Proposed Plan, November 2001	Provides a summary for the site including nature and extent of contamination, risk assessment, ARARs, RAOs, remediation goals, and remedial alternatives analysis.
Malcolm Pirnie Final ROD, November 2002	Provides a summary for the site including nature and extent of contamination, risk assessment, ARAR, RAOs, remediation goals, and remedial alternatives analysis.
Malcolm Pirnie Final ESD, September 2004	Provides a summary of the changes to the remedial action for the site which included the explanation of the excavation required to remove all sludges and concrete debris.

Documents	Summary of Contents Relevant to Five-Year Review
Malcolm Pirnie Final RA Report, September 2006	Provides a summary of the remedial action and any post-remedial action sampling and analysis.
Malcolm Pirnie LTM Report, September 2008 for Final 2006 Report and July 2008 for Final 2007 Report	Provides the results of the annual LTM events.

### Data Review

The LTM program's objective is to implement a sampling program that adequately covers the areas that were impacted by the COCs and to assure that the RA taken has reduced the presence of COCs to levels below the remediation goals. Long term monitoring has included analysis for certain TCL VOCs, TCL PAHs, and TAL metals. The analytical results tables for all LTM events (2006 and 2007) are presented in **Appendix B**.

#### February 2006 LTM Event

No VOCs or PAHs were detected in any of the groundwater samples collected during the February 2006 LTM event.

A number of TAL metals were detected in total and dissolved samples; however, none of the concentrations of these detected metals exceeded their respective MCLs. For total metals analyses, 17 of the 23 TAL metals were detected in at least one groundwater sample from the site (arsenic, copper, mercury, selenium, silver, and thallium were not detected). For dissolved metals analyses, 19 of the 23 TAL metals were detected in at least one groundwater sample from the site (copper, mercury, silver, and thallium were not detected). In general, the highest metals concentrations were noted in the upgradient monitoring well (MW-01).

#### May 2007 LTM Event

The following presents the results of the most recent LTM groundwater event (May 2007) at the site.

#### VOCs

Only one VOC was detected in any of the wells. Methylene chloride was detected in MW-127 at a concentration of 0.82 µg/L, which is below the MCL of 5 µg/L; however, methylene chloride was also detected in the equipment rinsate sample associated with MW-127 at a concentration of 2.1 µg/L. Because it was detected in MW-127 and the rinsate sample below the MCL, the

presence of methylene chloride in the rinsate sample does not affect any conclusions drawn from the groundwater data.

#### *PAHs*

No PAHs were detected in the groundwater samples.

#### *Metals*

A number of TAL metals were detected in the dissolved samples; however, only one of the concentrations of these detected metals exceeded its respective MCL. For dissolved metals analyses, 16 of the 23 TAL Metals were detected in at least one groundwater sample from the site (arsenic, chromium, copper, lead, mercury, selenium, and vanadium were not detected). Although not detected in the 2006 monitoring event, thallium was the only metal that exceeded its MCL of 2 µg/L. It was detected in two wells having concentrations ranging from 4.8 µg/L to 7.7 µg/L, with the highest concentration detected in the upgradient well (MW-01). In general, the concentrations found in the upgradient monitoring well (MW-01) were on the higher end of detections.

### **Site Inspection**

A site inspection was conducted on November 19, 2007 by Joanna Bateman (Fort Eustis RPM), Fran Coulters (USAEC), Amber Michel (ASIS Fort Eustis Restoration Program Manager), Dave Glass (Malcolm Pirnie), Susan Herbert (Malcolm Pirnie), Rob Wasserman (ECC), Jerry Hoover (EPA Region III), and Wade Smith (VDEQ). The purpose of the site inspection for the Oil/Sludge Holding Pond site was to assess the protectiveness of the remedy through observation of site conditions including any erosion issues. No significant issues were identified during the site inspection.

Photographs from the site inspection are presented in **Appendix C**. A copy of the site inspection checklist is included in **Appendix D**.

### **Interviews**

Activities to involve the community in the Five-Year Review were initiated during a meeting of the Ft. Eustis Technical Review Committee (TRC) on October 25, 2007. It was at this time that the TRC was notified of the initial preparations to conduct the Five-Year Review. A summary of the Five-Year Review Report was presented to the TRC at the April 24, 2008 meeting. Additionally, a notice of availability of the draft Five-Year Review Report was provided to the public in the Daily Press on December 23, 2007 and in The Wheel on November 29, 2007. Copies of the

notices are presented in **Appendix A**.

### **3.4 TECHNICAL ASSESSMENT**

#### **Question A: Is the remedy functioning as intended by the decision documents?**

The review of documents, RAOs, ARARs, risk assumptions, monitoring results, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD and ESD. The site inspections did not identify any problems or disturbances of the clean fill, crushed stone or vegetation.

The LTM program showed that no PAHs and only one VOC (methylene chloride) were identified in the groundwater samples. Methylene chloride was detected in only one monitoring well (MW-127) and the concentration was below the MCL. While a number of the TAL metals (dissolved) were detected in groundwater samples, only one of the constituents (dissolved thallium) exceeded the RGs (i.e., MCLs). The highest concentration of thallium was noted in the reference well (MW-01) indicating that the site is not the contributor for the dissolved thallium results in the area. Based on this data, there would not be any unacceptable risk associated with site groundwater.

#### System Operations/Operation and Maintenance (O&M)/Monitoring Activities

The only O&M conducted at the site is the annual LTM program which includes the sampling and analysis of groundwater. Based on a review of the LTM program, the scope of the program and the data being collected appears sufficient to evaluate the effectiveness of the remedy. The LTM program includes the collection and analysis of samples throughout the site focusing on site groundwater up- and down-gradient of the former location of the buried sludge materials.

#### Opportunities for Optimization

It is recommended that the LTM program be eliminated. The detection of benzene above its MCL in one well in 1993 and the presence of the contaminated sludges at the site which could potentially impact groundwater quality were the reasons for the initiation of the LTM program.

No exceedences of EPA MCLs have been noted in the last four monitoring events for the site. This includes the two events prior to the RA (1993 Montgomery Watson RI sampling event and a 2001 Malcolm Pirnie groundwater monitoring event) and the two post-RA monitoring events (2006 and 2007 Malcolm Pirnie LTM events). No MCL exceedences have been noted throughout the 14-year period (1993 through 2007) over which these four events have occurred;

therefore, it is recommended that the LTM program be terminated. The monitoring data clearly indicates that the former sludge materials do not adversely affect groundwater quality at the site.

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

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered

As the remedial work has been completed at the site, all PRGs and action limits cited in the ROD have been met. There have been no changes in these standards in that the risk assumptions used to calculate them have not significantly changed.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

There have been no changes in the toxicity factors for the COCs that were used in the baseline human health risk assessment (HHRA). These assumptions are considered to be conservative and reasonable in evaluating risk and developing the risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. No quantitative remedial goals were developed for ecological receptors because no unacceptable risk was identified. Furthermore, there have been no changes to the standardized HHRA and ERA methodologies that could affect the protectiveness of the remedy.

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

No other information has come to light that could call into the question the protectiveness of the remedy.

**Technical Assessment Summary**

According to the data reviewed and the site inspection, the remedy is functioning as intended by the Malcolm Pirnie Final ROD and ESD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. Groundwater action limits have been met. There have been no changes in the exposure assumptions and toxicity factors that were used in the baseline HHRA and ERA that would affect the protectiveness of the remedy.

### **3.5 ISSUES**

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No issues identified.

### **3.6 RECOMMENDATIONS AND FOLLOW-UP ACTIONS**

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Per Section 3.4 Technical Assessment, the only recommendation is the termination of the LTM program.

### **3.7 PROTECTIVENESS STATEMENT**

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Based on the extent of contaminated material removal and the LTM groundwater monitoring data, the remedy is expected to be protective of human health and the environment.

This section presents the status of those Fort Eustis sites that do not currently require a five-year review because no removal or final RAs have taken place. It should be noted that as was the case for the five-year review sites previously discussed, a site inspection was conducted on November 19, 2007 by Joanna Bateman (Fort Eustis RPM), Fran Coulters (USAEC), Amber Michel (ASIS Fort Eustis Restoration Program Manager), Dave Glass (Malcolm Pirnie), Susan Herbert (Malcolm Pirnie), Rob Wasserman (ECC), Jerry Hoover (EPA Region III), and Wade Smith (VDEQ). The purpose of the site inspection for each of these status sites was to observe site conditions and the surrounding area. No significant issues were identified during the site inspection.

Photographs from the site inspection are presented in **Appendix C**. A copy of the site inspection checklist is included in **Appendix D**.

## **4.1 EUSTIS LAKE SITE**

### **4.1.1 Site Background**

Eustis Lake (FTEUST-36 and OU4) is a 45-acre reservoir located in the western portion of the main base. The location of Eustis Lake is presented on **Figure 1-1**. The lake was constructed between 1953 and 1956 by placing an earthen dam supporting a roadway and concrete spillway in a low lying drainage area near the mouth of a tidal tributary to the James River. The lake is used for recreational purposes primarily by installation personnel seeking fishing and recreational boating activities.

Elevated levels of PCBs were detected in sediments and fish tissue collected from the lake over the course of several studies. There have been no documented cases of the spillage or dumping of PCB-contaminated materials (e.g., transformer oils) into the lake; however, transformer oil spills have been noted in the Enlisted Barracks area of the post located north of the lake. Transport of PCBs may have occurred through storm water runoff from this area to the lake. In addition, numerous industrial operations including material storage areas are located in areas surrounding the lake where past spills or leaks may have occurred and impacted the lake.

### **4.1.2 Site Chronology**

A summary of previous investigations conducted at this site is provided in the table below.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Montgomery-Watson, Inc. Background Site Studies (January 1995)	Sampling and analysis of fish from Eustis Lake for use as a background site for the Brown's Lake RI.	PCBs were detected in catfish muscle and livers and shad muscle.
U.S. Army Center for Health Promotion and Preventive Medicine Risk Assessment (April 1995)	Fish, sediment and surface water sampling as part of a Human Health Risk Assessment for a Fish Consumption Advisory.	An unacceptable human health threat exists to individuals who regularly consume fish from the lake due to the elevated levels of PCBs. A "Catch and Release" policy was enacted.
Malcolm Pirnie Final RI Report (July 2003)	Fish, sediment and surface water sampling as part of the RI.	PCBs were detected in lake sediments and fish tissue samples. Risk assessment indicated unacceptable risk for humans and ecological receptors.
Malcolm Pirnie Sampling Event (2003/2004)	Fish tissue and sediment sampling event to assess trends in PCB contamination.	PCB concentrations are persistent at the site with little variation since the RI sampling efforts.
Malcolm Pirnie Draft Final FS Report (September 2007)	Revision of the human health and ecological risk assessments from the RI and evaluation of various remedial alternatives.	Unacceptable risk to human health and ecological receptors were identified and the remediation of PCB-contaminated sediments above 1 milligram per kilogram was recommended.

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.1.3 Site Status

The Draft Final FS Report was prepared and submitted to EPA Region III and VDEQ on September 13, 2007. The report recommended the remediation (excavation and off-site disposal) of sediments contaminated with PCBs at a concentration greater than 1 mg/kg. Upon finalization of the FS Report, additional documents including the Proposed Plan, ROD, and RD will be developed in support of the selected remedial alternative.

## 4.2 FELKER AIRFIELD TANK FARM

### 4.2.1 Site Background

The Felker Airfield Tank Farm (FTEUST-32 and OU8) is located at the southwest intersection of Mulberry Island Road and Condon Road. A northwest-southeast rail spur runs along the east side of the site, which runs parallel to Mulberry Island Road and the post golf course lies east of Mulberry Island Road. The site is bordered by an open field to the west, wooded marsh area to the south, and Condon Road (with woods beyond) to the north. The location of the site is provided on **Figure 1-1**.

The Felker Airfield Tank Farm Site consists of gravel lot approximately 250 by 200 feet with a perimeter security fence. Two 30,000-gallon aboveground storage tanks (AST) in concrete secondary containment are located at the south end of the site. A curbed, concrete parking pad for fueling trucks is located adjacent to north of the ASTs. A drain in the pad appears to discharge to the AST containment structure. A refueling island with two curbed, concrete refueling pads adjacent on either side of the island is located at the north end of the site. A small storage shed is located in the northwest corner of the site. The site has historically been used for the storage of JP-8 aviation fuel and is currently used for this purpose. The fuel is stored in the ASTs at the site and is transported to the Felker Airfield, located adjacent to the site, via tanker truck. According to previous investigations, historical operations at the site have impacted environmental media with petroleum.

### 4.2.2 Site Chronology

A summary of previous investigations conducted at this site is provided in the table below.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Montgomery-Watson (July 1992)	Preliminary Assessment Screening to determine if a release had occurred	A release of fuel to the environment had occurred at the Felker Fuel Farm
IT Corporation (April 1992 to February 1994)	Interim Remedial Measure to address contaminated soil	5,000 cubic yards of contaminated soil removed
Montgomery-Watson (January 1996)	Site Characterization Report	Site impacts presented an insignificant current risk to human and ecological receptors

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Malcolm Pirnie Draft RI Report (February 2004)	Field investigations and risk assessment conducted at the site	Various contaminants detected in site media (soil, sediment, and groundwater) and an unacceptable risk identified.

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.2.3 Site Status

The Draft RI Report was prepared and submitted to EPA Region III and VDEQ in February 2004. Comments from EPA and VDEQ have been received and the RI Report is in the process of being revised. A revised draft report and response-to-comments (RTC) package was submitted to EPA and VDEQ for their review in August 2008. Based on the results of the preliminary risk assessment in the RI and the fact that use of the site is to remain industrial, the site does not pose a risk that requires an action.

### 4.3 FIRE TRAINING AREA

#### 4.3.1 Site Background

The Fire Training Area (FTA) (FTEUST-6 and OU6) is an area located in the northwest section of the post (**Figure 1-1**). It is bordered to the west by the James River and to the north, east, and southeast by tidal wetland areas.

Fire-training activities were conducted monthly from 1968 until 1980. Sporadic fire training activities occurred at the site until approximately 1990. A Marine Fire Training Facility was built at the site in 1968 and included a smokehouse, aboveground burn tanks, a burn pit, a fuel feed system using underground piping, a self-contained water conveyance system with underground piping, and an oil/water separator (OWS). The burn pit was located approximately in the center of the site and was approximately 10-foot wide, 60-foot long, and 4-feet deep configured in a zig-zag pattern. Firefighting procedures would involve first filling the burn area with fuel. The fuel would then be ignited, and the trainees would put out the fire using water supplied from the OWS. Once the training operation had been completed, the wastewater (mixture of the spent fuel and the firewater) would flow by way of underground piping into the OWS. The fuel would then be separated by a weir allowing the fuel to collect in a sump on the outside of the OWS. An

oil pump was used to pump out the separated oil into a waste oil tanker truck. It is not known specifically how long the system was used but the entire facility was abandoned sometime in 1980, and probably covered with fill material.

In 1982, Chemical Systems Laboratory recommended that measures for containment of oil be undertaken and that leaching of chemicals into the subsurface media should be prevented (USATHAMA *Installation Assessment of Fort Eustis Report*, dated 1982). Subsequent to the 1982 investigations, contaminated soil was removed from the site. ESE did not observe any evidence of contamination at the site during its January 1987 site visit (*Update of the Initial Installation Assessment Final Report*, dated 1988). Montgomery Watson conducted their initial reconnaissance of the site in 1990 (in support of the RI) and did not observe the zig-zag burn pit. Another fire training facility was observed to have been in operation in 1990 which included a 3,500-gallon aboveground tank with the sides cut out and an earthen berm approximately 30 feet in diameter and 1 foot high. This bermed area is approximately 50 feet from the former zig-zag pit.

The site is currently used for instructing cargo and bulk item on-off loading procedures and vehicle driver certification preparation, and for quarterly field training exercise for large-scale military transportation operations. The southern section of the site is paved with asphalt, which was likely constructed to accommodate the current site activities.

#### 4.3.2 Site Chronology

A summary of previous investigations conducted at this site is provided in the table below.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
USATHAMA Installation Assessment of Fort Eustis Report (March 1982)	Assessment of Fort Eustis to determine the existence of toxic and hazardous materials.	Identified a firefighting training area with oil present in an unlined pit with oil spillage on nearby ground.
ESE Update of the Initial Installation Assessment Final Report (March 1988)	On-site records search to assess past and current of toxic materials.	No visible contaminated soils were present and reported project to construct an engineered firefighting training area with a concrete-lined pit and oil/water separator was underway.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Montgomery Watson Five-Site RI Report (February 1997)	Field investigations conducted from 1991 to 1994 to include the collection of surface water, sediment, soil, and groundwater samples and the evaluation of risk to human health and the environment.	High concentrations of VOCs were detected in one well on-site while no significant detects of contaminants were noted in the adjacent wetland area.
Malcolm Pirnie FS Field Investigations (2001 through 2005)	Collection of post-RI groundwater and sediment samples to further define the nature and extent of contamination.	Total VOC concentrations greater than 30 parts per million were noted in several wells on-site. Based on sediment data and sediment toxicity testing, no risk was noted in the adjacent marsh area.

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.3.3 Site Status

A Final Work Plan was prepared and submitted to EPA Region III and VDEQ in November 2007. The Work Plan outlines the procedures to be followed by Malcolm Pirnie in the performance of additional field investigations to be conducted at the site. A summary of the investigations to be conducted is presented as follows:

- Collection of groundwater samples for VOC and metal analysis from six direct push borings which are located on the leading edge of the VOC-contaminated plume already identified through previous groundwater sampling.
- Based on the results of the DPT sampling, three additional groundwater monitoring wells will be installed at the site to further define the extent of contamination.
- Groundwater samples for VOC and metal analysis will be collected from the three newly-installed wells and from the 16 existing wells to further assess groundwater quality.

Upon implementation of the Work Plan, the data will be evaluated and incorporated into the Draft FS Report. Additional investigations expected for the FTA site include the preparation of the Proposed Plan, ROD, and RD, and implementation of a RA and a LTM program.

#### **4.4 FORMER SKEET AND TRAP RANGE – UPLAND AREA**

##### **4.4.1 Site Background**

As presented on **Figure 1-1**, the former Skeet and Trap Range site is located in the northern portion of the main post and is bounded by Bailey Creek on the north, a wooded area on the east and west, and Lee Boulevard on the south. Since 20 acres of the Redcross Property site was purchased by Fort Eustis in 2005, that area has been incorporated into the on-post upland portion of the site. The former Redcross Property parcel and the on-post upland area of the site are now entitled the Former Skeet and Trap Range – Upland Area (FTEUST-37 and OU11) while the Bailey Creek channel, associated Bailey Creek wetland, and former Redcross Property wetland area is now to be called the Former Skeet and Trap Range – Wetland Area (FTEUST-38 and OU12). The wetland area will be discussed in Section 4.5 of this report.

The Skeet and Trap Range operated from the 1960s to May 1998. There were three main firing stations; two skeet and one trap. A sporting clay station was also part of the trap range. Lead shot was predominately used until June 1997 when its use was discontinued and replaced with steel shot. Based on the information provided in a May 1996 information paper on the skeet and trap range, the skeet range had a 300-foot radius half circle shooting area and a 900-foot radius half circle for the shortfall danger zone. The lead and steel pellets were shot into the upper end of Bailey Creek and the adjacent tree line and soils, including the Redcross property.

##### **4.4.2 Site Chronology**

A summary of previous investigations conducted at this site is provided in the table below.

<b>PREVIOUS INVESTIGATIONS</b>		
<b>Investigation</b>	<b>Description</b>	<b>Results</b>
Malcolm Pirnie Soil Classification Sampling Event (February 2000)	Soil sampling and analysis event to classify (hazardous or non-hazardous waste based on TCLP lead results) the soils in the open area of the site.	TCLP lead concentrations in several of the soil samples exceeded the RCRA hazardous waste limit of 5 milligrams per liter.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Malcolm Pirnie Lead Sampling and Soil Classification Sampling Event (May 2001)	Soil sampling and analysis event to (1) assess the extent of lead contamination in the open area of the site and (2) classify (hazardous or non-hazardous waste based on TCLP lead results) the soils in the open area of the site.	Lead concentrations from adjacent to and behind the firing lines were below the EPA action limit of 400 mg/kg. TCLP lead concentrations in several of the soil samples exceeded the RCRA hazardous waste limit of 5 milligrams per liter.
Air Power Open Area Site Restoration Action (March through April 2002)	Removal of soils and building materials from open and firing point areas of the site.	Top six inches of soils were removed from the open area of the site totaling approximately 2,300 cubic yards. Soils were disposed of off-site in RCRA Subtitle C and D facilities dependent upon the TCLP lead levels.
Air Power Wooded Area Site Restoration Action (June through November 2003)	Removal of trees and soils from the wooded area adjacent to the open area of the site.	Top 1 to 2 feet of soils were removed from the wooded area of the site totaling approximately 1,190 cubic yards. Soils were disposed of off-site in RCRA Subtitle C facility based upon previous TCLP lead concentrations.
Malcolm Pirnie Draft SRRR (June 2004) – RTC package submitted to EPA/VDEQ on September 12, 2005	Collection of confirmation samples to verify that the two previous actions met the remedial goals and documentation of the specifics of the open and wooded area actions.	Confirmation samples indicated that sufficient soils had been removed to consider the areas no potential risk and classified for unrestricted land use.
Malcolm Pirnie Final Site Characterization Report (SCR), Redcross Property (March 2003) – U.S. Fish and Wildlife Service conducted the sampling program as well as the evaluation of ecological risk.	Field investigations conducted in 2002 included the collection of surface water, sediment, and soil samples and the evaluation of risk to human health and the environment.	Lead concentrations exceeded the EPA soil standard of 400 mg/kg in only three soil samples. Lead concentrations in sediment were detected up to 1,200 mg/kg. Potentially exposed human and ecological receptors were identified.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Malcolm Pirnie Draft SCR, On Post Property (December 2002) – U.S. Fish and Wildlife Service conducted the sampling program as well as the evaluation of ecological risk.	Field investigations conducted in 2002 included the collection of surface water, sediment, and soil samples and the evaluation of risk to human health and the environment.	Lead concentrations in site soils exceeded the EPA standard of 400 mg/kg in numerous samples in the wooded areas of the site. Lead concentrations in sediment exceeded 100,000 mg/kg. Potentially exposed human and ecological receptors were identified at the site.
Malcolm Pirnie Draft FS Report – Redcross Property (July 2003)	Identification of RAOs and remedial alternatives for the remediation of soils and sediments on the Redcross Property.	Identified soil excavation and off-site treatment and disposal as the preferred alternative.
Malcolm Pirnie Draft FS Report – Upland Area (Preparation of report on-going)	Identification of RAOs and remedial alternatives for the remediation of soils and sediments in the upland area of the site.	To be determined

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.4.3 Site Status

The status of several on-going investigations/documents is presented as follows:

- The RTC package to the Draft SRRR was prepared and submitted to EPA Region III and VDEQ on September 12, 2005.
- The Draft SCR for the upland area was submitted to the regulatory agencies for review and comment in April 2008. A RTC package accompanied the redline/strikeout version of the Draft SCR.
- The Draft FS Report for the upland area is currently undergoing revision (due to its joining of the On-post FS and Redcross FS Reports) and should be submitted to regulatory agencies for review and comment in August 2008.

Upon finalization of the SCR and FS Reports, additional documents including the Proposed Plan and ROD will be prepared. It is unclear whether the preparation of additional documents including a RD and LTM Plan will be required.

## **4.5 FORMER SKEET AND TRAP RANGE – WETLAND AREA**

### **4.5.1 Site Background**

As presented on **Figure 1-1**, the former Skeet and Trap Range – Wetland Area (FTEUST-38 and OU12) is located in the northern portion of the main post and is bounded by Landfill No. 15 on the north, a wooded area on the east and west, and the former Skeet and Trap Range – Upland Area on the south. The sediment contamination in the upper end of Bailey Creek on Fort Eustis appears to be due to the lead shot associated with the Skeet Range. The contaminant area has been defined within the shot zone associated with the Skeet Range, and encompasses approximately 11 acres with lead detected to a depth of approximately 2 feet below grade. Surface water samples collected from this area have indicated lead concentrations greater than the Federal Ambient Water Quality Criteria. Potential risks to waterfowl were identified associated with ingestion of lead shot.

### **4.5.2 Site Chronology**

A summary of previous investigations conducted at this site is provided in the table below.

<b>PREVIOUS INVESTIGATIONS</b>		
<b>Investigation</b>	<b>Description</b>	<b>Results</b>
U.S. Army Environmental Hygiene Agency (USAEHA) Landfill Study (1977)	Investigation (surface water and sediment sampling) of Landfill No. 15 to assess its impact on Bailey Creek.	Lead was detected in sediment samples collected within Bailey Creek. The USAEHA concluded that Landfill 15 was the source of elevated lead concentrations in the sediment and surface water.
Sirrine Environmental Consultants (SEC) RI, Landfill 7 and 15 (1989)	SEC collected groundwater, surface water, sediment and soil samples from the area around Landfill No. 15. Samples were analyzed for volatile and semivolatile organics, pesticides, PCBs, metals and hydrocarbons.	From the results, SEC concluded that the contaminants in Bailey Creek were not attributable to leachate from the landfill.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Montgomery Watson RI, Bailey Creek, Phase 1 through 3 Investigations (1990 - 1994) (Five-Site RI Report finalized in February 1997)	Extensive field investigation program conducted in three phases to include surface water, sediment, soil, and fish tissue sampling and analysis. RI report included site investigation, risk assessment, and fate and transport evaluations.	Extensive PCB contamination detected throughout Bailey Creek and lead detected in the upper reaches of the creek which was attributed to the Skeet Range activities.
Malcolm Pirnie Bailey Creek Monitoring Program (1995 – 1998)	Sediment and surface water sampling program throughout the Bailey Creek watershed to include analysis of samples for PCBs and lead.	Lead detected throughout the upper reaches of Bailey Creek.
Malcolm Pirnie Draft SCR, On Post Property (December 2002) – U.S. Fish and Wildlife Service conducted the sampling program as well as the evaluation of ecological risk.	Field investigations conducted in 2002 included the collection of surface water, sediment, and soil samples and the evaluation of risk to human health and the environment.	Lead concentrations in sediment exceeded 100,000 mg/kg. Potentially exposed human and ecological receptors were identified at the site.

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.5.3 Site Status

The status of several on-going investigations/documents is presented as follows:

- The Draft SCR for the wetland area was submitted to the regulatory agencies for review and comment in April 2008. A RTC package accompanied the redline/strikeout version of the Draft SCR.

Additional investigations expected for the Skeet Range Wetland Area include the preparation of the FS, Proposed Plan, ROD, and RD, and implementation of a RA and a LTM program.

## 4.6 MILSTEAD ISLAND CREEK

### 4.6.1 Site Background

As presented on **Figure 1-1**, Milstead Island Creek (FTEUST-27 and OU3) is a tidal waterway that links the James and Warwick Rivers. The Creek is located in the southern portion of the Fort Eustis Main Post Area. Milstead Island Creek was initially a natural water way until a canal/drainage was constructed as a link between the James and Warwick Rivers during the Civil War. The resulting water way consists of three distinct sections: the original extent of Milstead Island Creek, the dredged link in the center, and Butler's Gut. The whole of the water way is tidal and flows in both directions, alternating flowing into the Warwick and James Rivers in time with the tides. The drainage way is approximately 8,700 feet long and ranges from between 40 and 100 feet across and two to six feet deep. The site contains wetlands at both the James River and Warwick River intersections. The creek intersects the James River, along Harrison Road near the intersection of Taylor Road, and the Warwick River, adjacent to and south of Landfill 7.

During investigations of Milstead Island Creek conducted since 1989, sediment and water samples have been collected and the biota of the creek has been examined. Pesticides, metals, and fuel-related PAHs have been detected in the sediments and surface water of the creek.

### 4.6.2 Site Chronology

A summary of previous investigations conducted at this site is provided in the table below.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
SEC Landfill No. 7 RI (1998)	Soil/sediment and surface water samples were collected from eight locations in Milstead Island Creek. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, and TPH.	Pesticides, metals, and PAHs were detected in sediments. Conclusion was that the contaminants detected in Milstead Island Creek were probably from a source(s) other than Landfill No. 7.
Montgomery Watson RI, Milstead Island Creek, Phase 1 through 2 Investigations (1990 and 1993) (Five-Site RI Report finalized in February 1997)	Field investigation program include surface water and sediment sampling. RI report included site investigation, risk assessment, and fate and transport evaluations.	Pesticides, PAHs, and metals were detected in several areas of Milstead Island Creek above regulatory thresholds.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Malcolm Pirnie Final Supplemental Site Evaluation (February 2006)	The 2002 sampling event consisted of the following: (1) Collection of four surficial sediment samples with analysis for low-level PAHs, pesticides, metals, total organic carbon, and grain size, (2) collection of sediment samples for sediment toxicity testing, and (3) the collection of benthic taxonomy samples. An ecological risk assessment was conducted.	Based upon the results of the ERA and the sediment toxicity testing, it appears the site does not pose a significant risk to ecological receptors; therefore, no further action was recommended for the site.
Malcolm Pirnie Final Proposed Plan (September 2006)	Presentation of site history and recommendations for future activities.	Presents summary of previous investigations at the site and that no further action is recommended for the site.
Malcolm Pirnie Draft ROD (March 2007)	Presentation of site history and recommendations for future activities.	Presents summary of previous investigations at the site and that no further action is recommended for the site.

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.6.3 Site Status

A RTC package will accompany a redline/strikeout version of the Final Draft ROD for Fort Eustis, EPA, and VDEQ approval prior to finalizing. After finalization of the ROD, no additional investigations are expected for this site.

### **4.7 OFFICER'S CLUB LANDFILL NO. 1**

#### 4.7.1 Site Background

As presented on **Figure 1-1**, the Officer's Club Landfill No. 1 (FTEUST-1 and OU10) is an unpermitted facility located on the eastern boundary of the installation near the Officer's Club and adjacent to the Warwick River. Based on aerial imagery, the landfill was operated from at least 1937 until 1953. Open trench and ramp methods of disposal operations were used.

Various types of trash, construction debris, waste oil, paint, and garbage are reported to have been placed in the landfill. Open burning operations were conducted and an incinerator was constructed at the landfill during the late 1940s and early 1950s. The landfill was capped with earthen materials in the early 1960s.

#### 4.7.2 Site Chronology

A summary of previous investigations conducted at this site is provided in the table below.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
USATHAMA Installation Assessment of Fort Eustis Report (March 1982)	Assessment of Fort Eustis to determine the existence of toxic and hazardous materials.	Identified this landfill near the Officer's Club.
ESE Update of the Initial Installation Assessment Final Report (March 1988)	On-site records search to assess past and current of toxic and hazardous materials.	Confirmed the presence of the landfill.
SEC Confirmation Study (December 1988)	Four monitoring wells were installed and sampled for VOCs, SVOCs, TPH, PCBs, pesticides, herbicides, total and dissolved metals, and total dissolved solids to assess groundwater quality in the area of the site.	Sirrine concluded that all parameters were below regulated levels, and thus, below levels of concern to human health and the environment. Periodic analysis of groundwater was recommended to obtain baseline data concerning groundwater quality.
Weston PA Report for Fort Eustis (November 1990)	Assessment to assist EPA in completing the PA process including scoring the site and determining future actions.	Assessed the characteristics (groundwater data, topography, etc) for the landfill site.
Montgomery Watson Groundwater Monitoring Program (1990 – 1993)	Assess groundwater quality at the site through the collection of samples from 4 wells.	Dissolved beryllium and nickel exceeded their respective MCLs in MW-104.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
USACE Norfolk District Groundwater Monitoring Program (1994)	Assess groundwater quality at the site through the collection of samples from 4 wells.	Dissolved beryllium and nickel exceeded their respective MCLs in MW-104.
Malcolm Pirnie Groundwater Monitoring Program (1995 – 1997)	Assess groundwater quality at the site through the collection of samples from 4 wells.	During the three-year monitoring period, a few metals (total beryllium and nickel in one well in 1995 and 1996, and total and dissolved nickel in one well in 1997) were detected above the MCLs. Based on the groundwater results, it was concluded that a contaminant release from Landfill No. 1 was not identified and that the majority of the metals concentrations in groundwater reflected natural spatial variability. The monitoring program was thereby discontinued.
Malcolm Pirnie Draft Proposed Plan (August 2007)	Presentation of site history and recommendations for future activities.	Presents summary of previous investigations at the site and that no further action is recommended for the site.

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.7.3 Site Status

Malcolm Pirnie is currently revising the August 2007 Draft Proposed Plan for Landfill No. 1. A RTC package will accompany a redline/strikeout version of the Final Draft Proposed Plan for Fort Eustis, EPA, and VDEQ approval prior to finalizing. Submittal of the RTCs and the Final Draft Proposed Plan is expected in August 2008. A ROD will also be prepared for the site. After finalization of the ROD, no additional investigations are anticipated for Landfill No. 1.

**4.8 LANDFILL No. 7****4.8.1 Site Background**

As presented on **Figure 1-1**, Landfill No. 7 (FTEUST-04 and OU9) is an unpermitted facility comprising approximately 54 acres in the southern portion of Fort Eustis adjacent to the Warwick River. The landfill is bisected by a small stream that flows from Brown's Lake to the Warwick River. The eastern portion of the landfill was operated between approximately 1951 and 1956. Operations followed at the western part of the landfill from approximately 1956 to 1972 and ceased prior to the promulgation of the Virginia Solid Waste Management Regulations. The landfill has an extensive natural buffer zone on all perimeters except the north side of the western portion. In this region, there are several slab-on grad buildings and a system of paved roads.

The uppermost sediments encountered at the site to an approximate depth of 15 feet are typically interlayered and intermixed silty sands, poorly graded sands, and small amounts of clay. Groundwater elevations vary from depths of 3 to 14 feet bgs. Groundwater flow is from the higher topographic area near the Helicopter Maintenance Area (HMA) site toward the Warwick River. The Warwick River serves as a discharge point for the surrounding area.

**4.8.2 Site Chronology**

A summary of previous investigations conducted at this site is provided in the table below.

<b>PREVIOUS INVESTIGATIONS</b>		
<b>Investigation</b>	<b>Description</b>	<b>Results</b>
USACE Norfolk District Landfill FS Report, 1983	Assessment of remedial alternatives for landfill closure	Landfill capping is an acceptable remedy
USAEHA Geohydrologic Study, Groundwater Quality at Closed Landfills, 1985	Study of groundwater characteristics	Various metals and other inorganics present in site groundwater. Iron and manganese concentrations exceeded EPA secondary MCLs and lead exceeded the 50 µg/L MCL in one well.
Sirrine Final RI Report, 1989	Assessment of nature and extent of contamination, fate and transport and risk assessment	Miscellaneous organics and numerous metals were detected in the groundwater. The only exceedences of MCLs were in well A-3 which is the upgradient well that is impacted by contaminants from the HMA site.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Montgomery Watson Final FS for Landfills 7 and 15	Assessment of various remedial alternatives	Soil cap with methane probes were determined to be the best available remedy for landfill capping.
Montgomery Watson Groundwater Monitoring Program, 1993 – 1995	Groundwater monitoring program	VOCs and SVOCs were detected during this program but concentrations did not exceed MCLs. A few metals exceeded primary MCLs including total cadmium, chromium, lead, mercury, and zinc; however, no dissolved metals exceeded primary MCLs.
Malcolm Pirnie Water Quality Monitoring Program, 1995 – 1997	Groundwater monitoring program	Several total metals concentrations exceeded MCLs including arsenic and lead in two wells (MWA6 and MW-112) during the three year program. Dissolved arsenic exceeded the 10 µg/L MCL in the same two wells in 1995 but not in 1996 or 1997.
Malcolm Pirnie Final Pre-Design Investigation Report, Landfill Gas Remedial System Design, 1997	Pre-design activities associated with landfill conditions	Landfill conditions warrant the installation of a gas collection system outside of the limits of the landfill.
Malcolm Pirnie Landfill Gas Assessment Report, 1997	Assessment of the methane concentrations	Methane detected outside of the landfill near the warehouse buildings.
Malcolm Pirnie Landfill Gas Remedial Designs, 1997	Design of gas remediation system	Gas remediation system (gas extraction wells with a treatment system) designed.
Malcolm Pirnie Draft Proposed Plan, August 2007	Presentation of site history and recommendations for future activities.	Presents summary of previous investigations at the site and that no further action is recommended for the site.

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.8.3 Site Status

Malcolm Pirnie is currently revising the August 2007 Draft Proposed Plan for Landfill No. 1. A RTC package will accompany a redline/strikeout version of the Final Draft Proposed Plan for Fort Eustis, EPA, and VDEQ approval prior to finalizing. Submittal of the RTCs and the Final Draft

Proposed Plan is expected in August 2008. A ROD will also be prepared for the site. After finalization of the ROD, no additional investigations are anticipated for Landfill No. 7.

## **4.9 BROWN'S LAKE**

### **4.9.1 Site Background**

Brown's Lake (FTEUST-29 and OU2) is a manmade freshwater lake in the southern portion of the Fort Eustis Main Post Area. The location of the site is presented on **Figure 1-1**. The Lake was formed in the 1950s by constructing an earthen dam across a small stream flowing south towards the Warwick River. The Lake is roughly triangular in shape with the earthen dam forming the base of the triangle at the lake's southern end. Brown's Lake has an approximate length of 650 feet, a maximum width of about 300 feet, and an approximate total surface area of 121,000 square feet. The Lake is very shallow at the northern end, and becomes progressively deeper as it approaches the dam. The maximum water depth in the Lake is approximately 10 feet.

Brown's Lake is situated in a topographically low area with gradual inclines away from the Lake on its western, eastern, and northern sides. The land surface slopes gently away from the Lake on the south side, opposite the dam location. Based on a depth survey conducted by Fort Eustis personnel in May 1998, the Lake is shallow in the upper end with depths ranging from 1 to 3 feet and deeper in the lower end near the dam with a maximum depth of approximately 10 feet.

The watershed of Brown's Lake covers over 75 acres. The primary source of water in Brown's Lake is a drainage ditch discharging into the north end of the lake. This ditch contains stormwater runoff from vehicle maintenance facilities, a locomotive shop, and residential and open areas. A pesticide mixing area was formerly located in the drainage area, on the site of the present Directorate of Public Works.

The primary source of contaminants in Brown's Lake is surface water runoff from the Brown's Lake watershed, including vehicle, locomotive and helicopter maintenance areas. Materials currently and/or formerly used in this area include fuels, motor oils, fuel oil, paints, and pesticides. Past management and use practices could have resulted in these materials being discharged into storm drains. Normal application of pesticides along the lake's northern, western, and eastern banks may also be a source of contaminants. The sediments of Brown's Lake contain pervasive compounds such as chlordane and dichlorodiphenyltrichloroethane (DDT) which are no longer in use at Fort Eustis. For example, the use of DDT was discontinued around 1972. Therefore, at least some of the contamination in Brown's Lake has originated from past practices at the base. It is not known if current stormwater runoff continues to be a source of contamination to Brown's Lake. Practices have been instituted at the base to reduce the

amount of material in stormwater discharges. Structural modifications and management practices implemented in the watershed over the past ten years have significantly reduced contaminant sources in the watershed.

#### 4.9.2 Site Chronology

A summary of previous investigations conducted at this site is provided in the table below.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Montgomery Watson RI, Bailey Creek, Phase 1 through 3 Investigations (Five-Site RI Report finalized in February 1997)	RI at the site to include surface water, sediment, and fish tissue sampling and analysis	Various contaminants including pesticides, PAHs, and metals detected in all site media
Malcolm Pirnie Final Interim Removal Action Report, 1999	Removal action of site sediments	Action included the removal of sediment from the upper ditch and the lake and the placement of 2 foot of soil cover over the excavated areas
Malcolm Pirnie Post-IRA Monitoring Program, 2000 - 2004	Monitoring program to assess sediment, surface water, and fish tissue quality	Various pesticides, PAHs, and metals detected in all site media
Malcolm Pirnie FS Report, 2005	Evaluation of RAOs, remediation goals, and remedial alternatives	Additional removal required for upper ditch sediments with the installation of a sediment trap to preclude sediment contamination from entering Brown's Lake
Malcolm Pirnie Proposed Plan, 2005	Presentation of site history and recommendations for future activities.	Presents summary of previous investigations, risk assessment, and the preferred remedy
Malcolm Pirnie Final RD Memorandum, 2008	Presentation of site history and recommendations for future activities.	Presents RD for the selected remedy
Malcolm Pirnie ROD, 2007	Presentation of site history and recommendations for future activities.	Presents summary of previous investigations, risk assessment, RAOs, ARARS, remediation goals, and the selected alternative

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

### 4.9.3 Site Status

The draft remedial action work plan (RAWP) is currently being finalized based on regulatory agency comments. After finalization of the RAWP, the remedy will be implemented followed by LTM and continued land use controls (no fishing or swimming).

## 4.10 BAILEY CREEK

### 4.10.1 Site Background

The Bailey Creek (FTEUST-30 and OU1) drainage basin forms the northeastern boundary of Fort Eustis with the Creek entirely contained within the facility boundaries. The Creek is a tidal estuary of Skiffes Creek with a drainage area of approximately 1.06 square miles. Length of the main stem is approximately 1.5 miles, extending from the mouth of the Creek east to the facility boundary. Bailey Creek can be divided into four morphologically distinct areas: lower, middle, and upper reaches and a tributary augmented by storm water discharge from Outfall 018 Tributary. Bailey Creek is located in the northwest corner of Fort Eustis. It enters Fort Eustis in the vicinity of the Former Skeet and Trap Range and flows northwest, parallel to Lee Boulevard, into Skiffes Creek and the James River. The Creek is tidal throughout its entire length. The location of the site is included on **Figure 1-1**.

Bailey Creek is situated in a topographically low wetlands area. The upland edge of the Creek consists of a series of fingers that project into the wetland. These upland fingers are steep sided, often rising 10 feet to 30 feet above the level of the wetland, and are vegetated with mature oak/pine forest. Large American beech trees (*Fagus grandifolia*) are also prominent among the oaks (*Quercus sp.*) and pine (*Pinus sp.*). The ratio of oak to pine varies greatly throughout the forest.

PCB contamination has been detected throughout the middle to upper reaches of Bailey Creek. While significant levels of PCBs (3.2 mg/kg) have been detected in the main stem of Bailey Creek, the concentrations were much lower than the drainage channel where the IRA was completed in 2000. Prior to the initiation of the IRA, the highest concentrations of PCBs were found in the drainage swale, the wooded wetland, and marsh sediments downstream of storm water outfall 018. Thus, these sediments acted as a "secondary" source. Aroclor 1260 was predominantly detected with concentrations up to 2,200 mg/kg. Removal of these sediments during the IRA significantly reduced PCB 'loading potential' to the main stem of Bailey Creek.

### 4.10.2 Site Chronology

A summary of previous investigations conducted at this site is provided in the table below.

PREVIOUS INVESTIGATIONS		
Investigation	Description	Results
Montgomery Watson RI, Bailey Creek, Phase 1 through 3 (Five-Site RI Report finalized in February 1997)	RI included sampling of sediment, surface water, soil, and fish tissue. Baseline human health and ecological risk assessment completed.	PCB contamination widespread through the Bailey Creek watershed. Unacceptable risk noted for various ecological receptors and human receptors who contact site sediments or ingest fish.
Malcolm Pirnie Bailey Creek Monitoring Program, 1995 - 1998	Monitoring program for Bailey Creek watershed.	PCBs detected throughout the sediments in the watershed but not in surface water
IRA Report, 2000	Removal action for tributary area of Bailey Creek	Approximately 3,500 tons of sediment was excavated from the drainage swale, wooded area, and the marsh area downstream of Stormwater Outfall No. 018. Site was restored and vegetation re-planted.
Malcolm Pirnie Draft FS Report, 2003	Development of ARARs, RAOs, remedial alternatives and the evaluation and recommendation of a preferred alternative.	A LTM program was recommended.
ECC/Malcolm Final Draft Sampling and Analysis Plan (SAP), 2007	Sampling program to further assess PCB impacts to sediments and aquatic species	Fish tissue and sediment samples collected throughout the watershed to further assess PCB contamination.

More details on the previous investigations referenced above can be found in the Administrative Record for Fort Eustis.

#### 4.10.3 Site Status

A revised baseline human health and ecological risk assessment was prepared by ECC/Malcolm Pirnie and submitted to the regulatory agencies for review on February 2008. A RTC package is currently being prepared for the EPA and VDEQ comments to the risk assessment document. Submittal to the regulatory agencies is expected in August 2008.

A revised Draft FS Report was submitted to the regulatory agencies in June 2008. Upon finalization of the FS Report, additional documents including the Proposed Plan, ROD, and RD will be developed in support of the selected remedial alternative.

The installation-wide conclusions and recommendations are presented below. These conclusions and recommendations are provided in the form of an installation-wide protectiveness statement and summary of requirements of the next five-year review.

## **5.1 PROTECTIVENESS STATEMENT**

The remedial actions that have been completed for the sites (DOL Storage Yard and Oil/Sludge Holding Pond) at Fort Eustis are protective of human health and the environment. The U.S. Army is continuing CERCLA investigations of the remaining sites. This five-year review shows that the U.S. Army is meeting the requirements of the ROD for the Oil/Sludge Holding Pond Site but not the DOL Storage Yard Site. The pesticide concentrations primarily in the forested wetland area at the DOL Storage Yard site continue to exceed the PALs as established the Final Malcolm Pirnie ROD as discussed in Section 2.

### **5.1.1 DOL Storage Yard Site**

The remedy is expected to be protective of human health and the environment. Although total DDT/DDE/DDD concentrations exceed the action limits in the forested wetland area, the overall potential ecological risk was significantly reduced as a result of the remedial action. A significant ecological impact due to these subsequent detections is not anticipated because of the following:

- This forested wetland area is not located within designated critical habitat for any protected species.
- Although some impacts to individual receptors or local invertebrates and plants are possible, the potentially impacted area is of such small acreage that minimal impacts to upper-trophic populations would be expected.
- Because of the small area with detects above the action limit, there is ample habitat at Fort Eustis surrounding this area to maintain a healthy, diverse ecosystem.

An ecological risk screening is anticipated to be conducted for the site as part of the 2008 LTM reporting process.

Long-term protectiveness of the remedial action will be verified by obtaining additional soil and sediment samples at the site especially in the forested wetland area to fully assess exceedences of site action limits and overall ecological receptor health. It is anticipated that the LTM program for the DOL Storage Yard will continue while the proposed recommendations included in this report are evaluated. Modifications to the LTM program, if any, will be made as a result of this evaluation.

**Final**

**Revision No.: 5**

**Date: August 28, 2008**

**SECTION 5**  
**INSTALLATION-WIDE CONCLUSIONS**  
**AND RECOMMENDATIONS**

**5.1.2 Oil/Sludge Holding Pond Site**

Based on the extent of contaminated material removal and the LTM groundwater monitoring data which indicates concentrations less than the MCL for all site-related constituents, the remedy is expected to be protective of human health and the environment.

**5.2 NEXT FIVE-YEAR REVIEW**

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The next five-year review for Ft. Eustis is required by August 2013, five years from the date of this review.

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**FIGURES**

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**FIVE-YEAR REVIEW REPORT  
FORT EUSTIS, VIRGINIA**

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**Figure 1-1**

**FIVE-YEAR REVIEW  
SITE LOCATIONS  
Fort Eustis, Virginia**

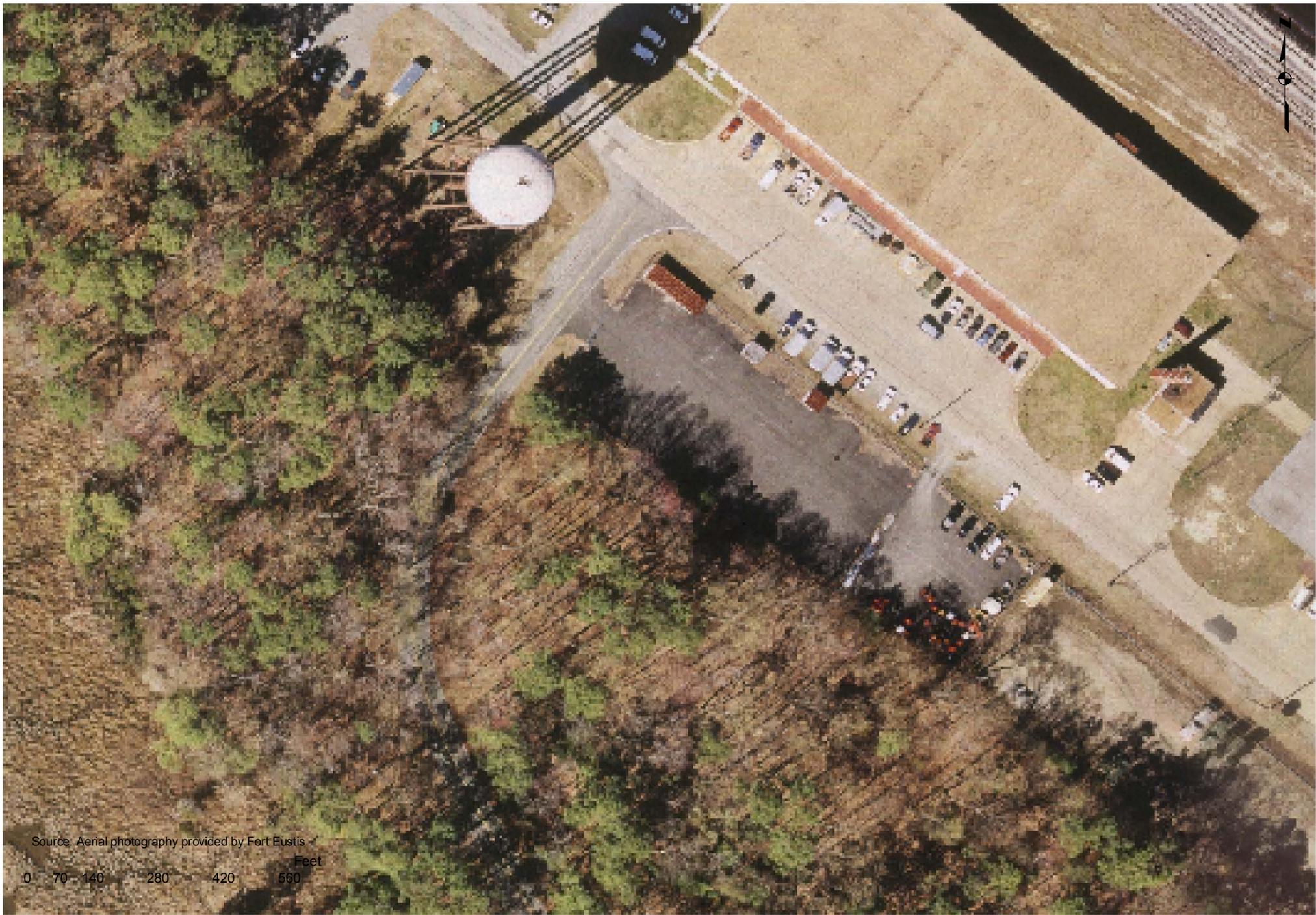
**Legend**

Site Locations



0 1,250 2,500 5,000 7,500 10,000 Feet

Source: Aerial photography provided by Fort Eustis



Source: Aerial photography provided by Fort Eustis

0 70 140 280 420 560 Feet



# FIVE-YEAR REVIEW DOL STORAGE YARD Fort Eustis, Virginia

MALCOLM PIRNIE, INC.

Figure 2-1

q



Source: Aerial photography provided by Fort Eustis

0 50 100 200 300 400 Feet



**FIVE-YEAR REVIEW  
OIL/SLUDGE HOLDING POND  
Fort Eustis, Virginia**

MALCOLM PIRNIE, INC.

**Figure 3-1**

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**APPENDIX A – PUBLIC NOTIFICATION**

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**FIVE-YEAR REVIEW REPORT  
FORT EUSTIS, VIRGINIA**

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10 November 29, 2007 The Wheel

## Note to the public

The Department of the Army and Fort Eustis, in cooperation with the U.S. Environmental Protection Agency and the Virginia Department of Environmental Quality, will be preparing its first five-year review of the Comprehensive Environmental Response, Compensation, and Liability Act sites located at Eustis.

The CERCLA program (also known as Superfund) authorized federal action to respond to the release of hazardous substances into the environment.

This review will evaluate the effectiveness and protectiveness of the remedial actions taken to date at the CERCLA sites at Eustis. The report, entitled "First Five-Year Review for CERCLA Sites at Fort Eustis, Virginia" is anticipated to be finalized in March 2008. For more information regarding this review contact:

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The Department of the Army and Fort Eustis, in cooperation with the United States Environmental Protection Agency and the Virginia Department of Environmental Quality, will be preparing its first five-year review of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites located at Fort Eustis, Virginia. The CERCLA program (also known as Superfund) authorized Federal action to respond to the release of hazardous substances into the environment. This review will evaluate the effectiveness and protectiveness of the remedial actions taken to date at the CERCLA Sites at Fort Eustis. The report, entitled "First Five-Year Review for CERCLA Sites at Fort Eustis, Virginia" is anticipated to be finalized in March 2008. For further information regarding this review please contact:

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## APPENDIX B – ANALYTICAL DATA

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### FIVE-YEAR REVIEW REPORT FORT EUSTIS, VIRGINIA

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FORT EUSTIS, VIRGINIA

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**APPENDIX B – DOL STORAGE YARD ANALYTICAL DATA**

**MALCOLM PIRNIE RI DATA**

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**FIVE-YEAR REVIEW REPORT  
FORT EUSTIS, VIRGINIA**

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**TABLE 4-5**  
**SOIL RESULTS - VOLATILE ORGANICS (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-001			SB34-002			SB34-003	SB34-006			EPA RBC Industrial/Residential <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	10 - 12 ft	0 to 6 in	4 to 6 ft	10 to 12 ft	0 to 6 in	0 to 6 in	4 to 6 ft	10 to 12 ft	
Acetone	< 12	< 12	< 13	18	< 11	< 12	< 11	< 11	< 10	8 J	200,000,000 / 7,800,000
Chloroform	< 12	< 12	< 13	< 12	< 11	< 12	< 11	< 11	< 10	< 11	940,000 / 100,000
Toluene	< 12	< 12	< 13	< 12	< 11	< 12	4 J	< 11	< 10	< 11	410,000,000 / 16,000,000
<b>TIC's</b>											
Benzaldehyde	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Cyclotetrasiloxane	9 NJY	ND	ND	200 NJY	9 NJY	ND	45 NJY	37 NJY	34 NJY	46 NJY	-
Dichlorobenzene isomer	ND	ND	ND	ND	ND	16 J	ND	ND	ND	ND	-
1-Propanol	ND	ND	ND	9 NJ	ND	ND	ND	ND	ND	ND	-
Trichlorobenzene isomer	ND	ND	ND	ND	ND	23 J	ND	ND	ND	ND	-
Trichlorobenzene isomer	ND	ND	ND	ND	ND	6 J	ND	ND	ND	ND	-

Parameters	SB34-009			SB34-012			SB34-014			SB34-017	EPA RBC Industrial/Residential <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	3 - 4 ft	7 - 8 ft	0 - 6 in	3 - 4 ft	7 - 8 ft	0 - 6 in	
Acetone	< 12	13	< 11	< 12	< 11	< 18	8 J	< 11	< 13	41	200,000,000 / 7,800,000
Chloroform	< 12	< 11	< 11	< 12	< 11	< 18	< 12	< 11	< 13	3 J	940,000 / 100,000
Toluene	< 12	< 11	< 11	< 12	< 11	< 18	< 12	< 11	< 13	4 J	410,000,000 / 16,000,000
<b>TIC's</b>											
Benzaldehyde	ND	ND	ND	ND	ND	ND	ND	ND	81 NJ	ND	-
Cyclotetrasiloxane	ND	ND	ND	41 NJY	ND	ND	230 NJY	ND	ND	60 NJY	-
Dichlorobenzene isomer	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
1-Propanol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Trichlorobenzene isomer	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
Trichlorobenzene isomer	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-

Notes:

- (1) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils
- (2) ND - Not detected

**Laboratory/Validation Qualifiers:**

- J - Estimated value
- N - Presumptive evidence of the compound based on the mass spectral library search
- Y - Siloxane contaminant attributed to trap breakdown.

**TABLE 4-6  
SOIL RESULTS - SEMIVOLATILE ORGANICS (ug/kg)  
DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-001			SB34-002			SB34-003	SB34-004		EPA RBC
	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	0 - 6 in	4 - 6 ft	Industrial/Residential <sup>(1)</sup>
Acenaphthene	< 760	< 380	< 840	270 J *	< 360	< 400	60 J	740 J	< 340	120,000,000 / 4,700,000
Anthracene	< 760	< 380	< 840	260 J *	< 360	< 400	180 J	1,500	< 340	610,000,000 / 23,000,000
Benzo(a)anthracene	250 J	< 380	< 840	<b><u>1,300</u></b> *	< 360	< 400	<b><u>1,100</u></b>	<b><u>4,900</u></b>	< 340	7,800 / 870
Benzo(a)pyrene	<b><u>240</u></b> J	< 380	< 840	<b><u>1,400</u></b> *	< 360	< 400	<b><u>1,100</u></b>	<b><u>4,200</u></b>	< 340	780 / 87
Benzo(b)fluoranthene	240 J	< 380	< 840	<b><u>2,000</u></b> *	40 J	< 400	<b><u>1,600</u></b>	<b><u>5,200</u></b>	< 340	7,800 / 870
Benzo(g,h,i)perylene	140 J	< 380	< 840	680 *	< 360	< 400	470	1,400 J	< 340	--- / ---
Benzo(k)fluoranthene	250 J	< 380	< 840	920 *	38 J	< 400	680	3,000	< 340	78,000 / 8,700
bis(2-Ethylhexyl)phthalate	< 760	120 J	120 J	94 J *	40 J	< 400	< 360	< 1,400	< 340	410,000 / 46,000
Butylbenzylphthalate	< 760	< 380	< 840	< 390	< 360	< 400	< 360	< 1,400	< 340	410,000,000 / 16,000,000
Carbazole	< 760	< 380	< 840	210 J *	< 360	< 400	73 J	1,000 J	< 340	290,000 / 32,000
Chrysene	300 J	< 380	< 840	1,600 *	41 J	< 400	1,400	5,300	< 340	780,000 / 87,000
Dibenz(a,h)anthracene	81 J	< 380	< 840	<b><u>440</u></b> J *	< 360	< 400	<b><u>300</u></b> J	<b><u>1,400</u></b> J	< 340	780 / 87
Dibenzofuran	< 760	< 380	< 840	72 J *	< 360	< 400	< 360	340 J	< 340	8,200,000 / 310,000
Di-n-butylphthalate	3,800 B	89 JB	3,300 B	150 B	47 J	86 J	2,800 B	< 1,400	< 340	200,000,000 / 7,800,000
Fluoranthene	600 J	< 380	< 840	2,600 *	76 J	< 400	1,800	9,900 J	< 340	82,000,000 / 3,100,000
Fluorene	< 760	< 380	< 840	140 J *	< 360	< 400	48 J	750 J	< 340	82,000,000 / 3,100,000
Indeno(1,2,3-cd)pyrene	170 J	< 380	< 840	780 *	< 360	< 400	510	<b><u>2,200</u></b>	< 340	7,800 / 870
2-Methylnaphthalene	< 760	< 380	< 840	< 390	< 360	< 400	< 360	< 1,400	< 340	41,000,000 / 1,600,000
Naphthalene	< 760	< 380	< 840	58 J *	< 360	< 400	< 360	200 J	< 340	41,000,000 / 1,600,000
Phenanthrene	370 J	< 380	< 840	1,500 *	< 360	< 400	820	7,200	< 340	--- / ---
Pyrene	490 J	< 380	< 840	2,500 *	62 J	< 400	1,800	7,800	< 340	61,000,000 2,300,000
<b>TIC's</b>										
9,10-Anthracenedione	ND	ND	ND	320 NJ	ND	ND	270 NJ	790 NJ	ND	-
7H-Benzanthracen-7-one	ND	ND	ND	ND	ND	ND	150 NJ	ND	ND	-
Benzo(b)naphthothiophene	ND	ND	ND	100 J	ND	ND	ND	ND	ND	-
Chlorophenothane	ND	ND	ND	ND	ND	ND	ND	540 NJ	ND	-
Cyclopentaphenanthrenon	ND	ND	ND	ND	ND	ND	150 NJ	ND	ND	-
Cyclopentasiloxane	ND	110 NJ	ND	ND	ND	ND	ND	ND	ND	-
9H-Fluoren-9-one	ND	ND	ND	82 NJ	ND	ND	ND	ND	ND	-
Hexadecanoic acid	330 XNJ	100 XNJ	190 XNJ	340 XNJ	75 XNJ	90 XNJ	ND	ND	160 XNJ	-
5,12-naphthacenedione	ND	ND	ND	ND	ND	ND	ND	710 NJ	ND	-
Octadecanoic acid	ND	ND	ND	ND	ND	ND	ND	920 NJ	ND	-
2-phenyl-naphthalene	ND	ND	ND	ND	ND	ND	ND	520 NJ	ND	-

Notes:

(1) EPA Region III RBC Criteria for Industrial/Residential Soils

(2) ND - Not detected

**bold dbl. underline** indicates concentration above RBC

\* - Result from duplicate sample

**Laboratory/Validation Qualifiers:**

J - Estimated value

N - Presumptive evidence of the compound based on the mass spectral library search

Y - Siloxane contaminant attributed to trap breakdown.

X - Designates a non-target which can be attributed to lab contamination

B - Indicates that this compound was present in the associated extraction blank

**TABLE 4-6 (Continued)**  
**SOIL RESULTS - SEMIVOLATILE ORGANICS (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-005		SB34-006			SB34-007		SB34-008		EPA RBC Industrial/Residential <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	0 - 6 in	4 - 6 ft	
Acenaphthene	< 360	< 380	11,000 J	400 J	160 J	53 J	< 350	70 J *	< 360	120,000,000 / 4,700,000
Anthracene	100 J	< 380	24,000	790	360	280 J	< 350	220 J *	< 360	610,000,000 / 23,000,000
Benzo(a)anthracene	430	< 380	<b>72,000</b>	<b>2,200</b>	<b>1,500</b>	700	< 350	<b>880 *</b>	< 360	7,800 / 870
Benzo(a)pyrene	<b>400</b>	< 380	<b>63,000</b>	<b>2,000</b>	<b>1,600</b>	<b>530</b>	< 350	<b>760 *</b>	< 360	780 / 87
Benzo(b)fluoranthene	390	< 380	<b>75,000</b>	<b>2,100</b>	<b>1,800</b>	<b>1,200</b>	< 350	<b>910 *</b>	< 360	7,800 / 870
Benzo(g,h,i)perylene	160 J	< 380	35,000	1,000	920	160 J	< 350	340 J *	< 360	--- / ---
Benzo(k)fluoranthene	400	< 380	<b>37,000</b>	1,400	930	680	< 350	660 *	< 360	78,000 / 8,700
bis(2-Ethylhexyl)phthalate	< 360	120 J	< 18,000	< 690	81 J	< 380	< 350	< 380	< 360	410,000 / 46,000
Butylbenzylphthalate	< 360	< 380	< 18,000	< 690	< 690	< 380	< 350	< 380	< 360	410,000,000 / 16,000,000
Carbazole	< 360	< 380	10,000 J	270 J	130 J	< 380	< 350	< 380	< 360	290,000 / 32,000
Chrysene	520	< 380	73,000	2,200	1,600	1,100	< 350	940 *	57 J	780,000 / 87,000
Dibenz(a,h)anthracene	<b>120 J</b>	< 380	<b>21,000</b>	<b>680 J</b>	<b>580</b>	<b>160 J</b>	< 350	<b>260 J *</b>	< 360	780 / 87
Dibenzofuran	< 360	< 380	5,400 J	160 J	55 J	< 380	< 350	< 380	< 360	8,200,000 / 310,000
Di-n-butylphthalate	< 360	89 JB	2,900 B	130 J	70 J	< 380	< 350	< 380	< 360	200,000,000 / 7,800,000
Fluoranthene	820	< 380	130,000	3,900	2,300	1,600	< 350	1,800 *	110 J	82,000,000 / 3,100,000
Fluorene	38 J	< 380	11,000 J	380 J	150 J	52 J	< 350	67 J *	< 360	82,000,000 / 3,100,000
Indeno(1,2,3-cd)pyrene	210 J	< 380	<b>40,000</b>	<b>1,100</b>	<b>940</b>	300 J	< 350	390 *	< 360	7,800 / 870
2-Methylnaphthalene	< 360	< 380	1,800 J	< 690	< 690	< 380	< 350	< 380	< 360	41,000,000 / 1,600,000
Naphthalene	< 360	< 380	5,400 J	100 J	35 J	< 380	< 350	< 380	< 360	41,000,000 / 1,600,000
4-Nitroaniline	< 360	< 380	< 18,000	< 690	< 690	< 380	< 350	70 J	< 360	--- / ---
Phenanthrene	460	< 380	81,000	2,400	1,100	740	< 350	1,000 *	< 360	--- / ---
Pyrene	820	< 380	100,000	3,100	2,000	1,100	< 350	1,400 *	84 J	61,000,000 2,300,000
<b>TIC's</b>										
9,10-Anthracenedione	ND	ND	4,600 NJ	ND	95 NJ	440 NJ	ND	160 NJ	ND	-
7H-Benzanthracen-7-one	100 NJ	ND	ND	ND	ND	ND	ND	ND	ND	-
Benzo(b)naphthothiophene	95 J	ND	ND	150 J	ND	ND	ND	ND	ND	-
Chlorophenothane	ND	ND	ND	ND	ND	2,000 NJ	ND	320 NJ	ND	-
Cyclopentasiloxane	ND	110 NJ	ND	ND	ND	ND	ND	ND	ND	-
Dibenzothiophene	ND	ND	5,400 NJ	140 NJ	ND	ND	ND	ND	ND	-
Hexadecanoic acid	ND	100 XNJ	ND	ND	ND	ND	170 XNJ	ND	ND	-
Methylchrysene isomer	83 J	ND	ND	ND	ND	ND	ND	ND	ND	-
Mitotane	ND	ND	ND	ND	ND	560 NJ	ND	ND	ND	-
5,12-naphthacenedione	ND	ND	ND	ND	ND	240 NJ	ND	ND	ND	-
Octadecanoic acid	ND	ND	ND	ND	ND	ND	ND	460 NJ	ND	-
2-phenyl-naphthalene	ND	ND	5,700 NJ	ND	100 NJ	ND	ND	ND	ND	-

Notes:

(1) EPA Region III RBC Criteria for Industrial/Residential Soils

(2) ND - Not detected

**bold dbl. underline** indicates concentration above RBC

\* - Result from duplicate sample

**Laboratory/Validation Qualifiers:**

J - Estimated value

N - Presumptive evidence of the compound based on the mass spectral library search

Y - Siloxane contaminant attributed to trap breakdown.

X - Designates a non-target which can be attributed to lab contamination

B - Indicates that this compound was present in the associated extraction blank

**TABLE 4-6 (continued)**  
**SOIL RESULTS - SEMIVOLATILE ORGANICS (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-009			SB34-010		SB34-012			EPA RBC Industrial/Residential <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	0 - 6 in	3 - 4 ft	7 - 8 ft	
Acenaphthene	240 J	< 360	< 360	< 360	< 350	< 410	< 720	< 610	120,000,000 / 4,700,000
Anthracene	410 J	< 360	< 360	< 360	< 350	< 410	< 720	< 610	610,000,000 / 23,000,000
Benzo(a)anthracene	<b>2,000</b>	< 360	< 360	< 360	< 350	< 410	< 720	< 610	7,800 / 870
Benzo(a)pyrene	<b>2,100</b>	< 360	< 360	< 360	< 350	< 410	< 720	< 610	780 / 87
Benzo(b)fluoranthene	<b>2,300</b>	< 360	< 360	< 360	< 350	< 410	< 720	< 610	7,800 / 870
Benzo(g,h,i)perylene	1,200	< 360	< 360	< 360	< 350	< 410	< 720	< 610	--- / ---
Benzo(k)fluoranthene	1,900	< 360	< 360	< 360	< 350	< 410	< 720	< 610	78,000 / 8,700
bis(2-Ethylhexyl)phthalate	340 J	< 360	< 360	< 360	< 350	< 410	< 720	< 610	410,000 / 46,000
Butylbenzylphthalate	< 820	< 360	< 360	< 360	< 350	< 410	76 J	< 610	410,000,000 / 16,000,000
Carbazole	230 J	< 360	< 360	< 360	< 350	< 410	< 720	< 610	290,000 / 32,000
Chrysene	2,200	< 360	< 360	< 360	< 350	< 410	< 720	< 610	780,000 / 87,000
Dibenz(a,h)anthracene	<b>730 J</b>	< 360	< 360	< 360	< 350	< 410	< 720	< 610	780 / 87
Dibenzofuran	100 J	< 360	< 360	< 360	< 350	< 410	< 720	< 610	8,200,000 / 310,000
Di-n-butylphthalate	120 JB	2,600 *	98 J	< 360	< 350	2,800 B	3,500 B	500 JB	200,000,000 / 7,800,000
Fluoranthene	3,600	< 360	< 360	< 360	< 350	< 410	< 720	< 610	82,000,000 / 3,100,000
Fluorene	220 J	< 360	< 360	< 360	< 350	< 410	< 720	< 610	82,000,000 / 3,100,000
Indeno(1,2,3-cd)pyrene	<b>1,200</b>	< 360	< 360	< 360	< 350	< 410	< 720	< 610	7,800 / 870
2-Methylnaphthalene	< 820	< 360	< 360	< 360	< 350	< 410	< 720	< 610	41,000,000 / 1,600,000
Naphthalene	< 820	< 360	< 360	< 360	< 350	< 410	< 720	< 610	41,000,000 / 1,600,000
Phenanthrene	2,000	< 360	< 360	< 360	< 350	< 410	< 720	< 610	--- / ---
Pyrene	3,200	< 360	< 360	< 360	< 350	< 410	< 720	< 610	61,000,000 2,300,000
<b>TIC's</b>									
9,10-Anthracenedione	480 NJ	ND	ND	ND	ND	ND	ND	ND	-
7H-Benzanthracen-7-one	220 NJ	ND	ND	ND	ND	ND	ND	ND	-
Benzo(b)naphthothiophene	270 J	ND	ND	ND	ND	ND	ND	ND	-
Cyclopentasiloxane	ND	ND	ND	ND	ND	ND	ND	200 NJ	-
Hexadecanoic acid	260 XNJ	86 XNJ	92 XNJ	ND	ND	370 NJX	ND	240 NJX	-
2-Methyl-Anthracene	240 NJ	ND	ND	ND	ND	ND	ND	ND	-
Octadecanoic acid	ND	ND	ND	330 NJ	640 NJ	ND	ND	ND	-

Notes:

(1) EPA Region III RBC Criteria for Industrial/Residential Soils

(2) ND - Not detected

**bold dbl. underline** indicates concentration above RBC

\* - Result from duplicate sample

**Laboratory/Validation Qualifiers:**

J - Estimated value

N - Presumptive evidence of the compound based on the mass spectral library search

Y - Siloxane contaminant attributed to trap breakdown.

X - Designates a non-target which can be attributed to lab contamination

B - Indicates that this compound was present in the associated extraction blank

**TABLE 4-6 (continued)**  
**SOIL RESULTS - SEMIVOLATILE ORGANICS (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-014			SB34-017	SB34-021		SB34-022		EPA RBC Industrial/Residential <sup>1)</sup>
	0 - 6 in	3 - 4 ft	7 - 8 ft	0 - 6 in	0 - 6 in	4 - 6 ft	0 - 6 in	4 - 6 ft	
Acenaphthene	< 380	< 360	< 430	< 420	< 390	< 380	< 370	< 380	120,000,000 / 4,700,000
Anthracene	50 J	< 360	< 430	< 420	< 390	< 380	< 370	< 380	610,000,000 / 23,000,000
Benzo(a)anthracene	280 J	< 360	< 430	< 420	86 J	< 380	< 370	< 380	7,800 / 870
Benzo(a)pyrene	<b><u>320 J</u></b>	< 360	< 430	< 420	<b><u>91 J</u></b>	< 380	< 370	< 380	780 / 87
Benzo(b)fluoranthene	370 J	< 360	< 430	< 420	100 J	< 390	< 370	< 380	7,800 / 870
Benzo(g,h,i)perylene	170 J	< 360	< 430	< 420	53 J	< 380	< 370	< 380	--- / ---
Benzo(k)fluoranthene	260 J	< 360	< 430	< 420	95 J	< 380	< 370	< 380	78,000 / 8,700
bis(2-Ethylhexyl)phthalate	86 J	< 360	< 430	< 420	< 390	< 380	< 370	< 380	410,000 / 46,000
Butylbenzylphthalate	< 380	< 360	< 430	< 420	< 390	< 380	< 370	< 380	410,000,000 / 16,000,000
Carbazole	< 380	< 360	< 430	< 420	< 390	< 380	< 370	< 380	290,000 / 32,000
Chrysene	330 J	< 360	< 430	< 420	100 J	< 380	< 370	< 380	780,000 / 87,000
Dibenz(a,h)anthracene	<b><u>110 J</u></b>	< 360	< 430	< 420	< 390	< 380	< 370	< 380	780 / 87
Dibenzofuran	< 380	< 360	< 430	< 420	< 390	< 380	< 370	< 380	8,200,000 / 310,000
Di-n-butylphthalate	120 JB	240 JB	360 JB	64 J	340 J	< 380	< 370	< 380	200,000,000 / 7,800,000
Fluoranthene	490	< 360	< 430	< 420	< 390	60 J	< 370	< 380	82,000,000 / 3,100,000
Fluorene	< 380	< 360	< 430	< 420	< 390	< 380	< 370	< 380	82,000,000 / 3,100,000
Indeno(1,2,3-cd)pyrene	180 J	< 360	< 430	< 420	58 J	< 380	< 370	< 380	7,800 / 870
2-Methylnaphthalene	< 380	< 360	< 430	< 420	< 390	< 380	< 370	< 380	41,000,000 / 1,600,000
Naphthalene	< 380	< 360	< 430	< 420	< 390	< 380	< 370	< 380	41,000,000 / 1,600,000
4-Nitroaniline	< 380	< 360	< 430	< 420	< 390	98 J	< 370	< 380	--- / ---
Phenanthrene	250 J	< 360	< 430	< 420	< 390	< 380	< 370	< 380	--- / ---
Pyrene	510	< 360	< 430	< 420	140 J	47 J	< 370	< 380	61,000,000 2,300,000
<b>TIC's</b>									
Caryophyllene	ND	ND	ND	430 NJ	ND	ND	ND	ND	-
alpha-Cubebene	ND	ND	ND	440 NJ	ND	ND	ND	ND	-
Hexadecanoic acid	270 XNJ	ND	ND	840 NJX	ND	ND	440 XNJ	310 XNJ	-
1,2,3,5,6,8a-Naphthalene	ND	ND	ND	1,200 NJ	ND	ND	ND	ND	-
Octadecanoic acid	ND	ND	ND	11,000 NJ	ND	ND	ND	ND	-

Notes:

(1) EPA Region III RBC Criteria for Industrial/Residential Soils

(2) ND - Not detected

**bold dbl. underline** indicates concentration above RBC

**Laboratory/Validation Qualifiers:**

J - Estimated value

N - Presumptive evidence of the compound based on the mass spectral library search

Y - Siloxane contaminant attributed to trap breakdown.

X - Designates a non-target which can be attributed to lab contamination

B - Indicates that this compound was present in the associated extraction blank

**TABLE 4-6 (continued)**  
**SOIL RESULTS - SEMIVOLATILE ORGANICS (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-025		SB34-028		SB34-029	EPA RBC Industrial/Residential <sup>1)</sup>
	0 - 6 in	4 - 6 ft	0 - 6 in	4 - 6 ft	0 - 6 in	
Acenaphthene	< 380	< 360	< 420	< 350	< 440	120,000,000 / 4,700,000
Acenaphthylene	50 J *	< 360	< 420	< 350	< 440	--- / ---
Anthracene	53 J *	< 360	< 420	< 350	< 440	610,000,000 / 23,000,000
Benzo(a)anthracene	310 J *	< 360	130 J	< 350	130 J	7,800 / 870
Benzo(a)pyrene	<b>320 J *</b>	< 360	<b>150 J</b>	< 350	<b>140 J</b>	780 / 87
Benzo(b)fluoranthene	430 *	< 360	170 J	< 350	160 J	7,800 / 870
Benzo(g,h,i)perylene	100 J *	< 360	56 J	< 350	85 J	-
Benzo(k)fluoranthene	310 J *	< 360	160 J	< 350	170 J	78,000 / 8,700
bis(2-Ethylhexyl)phthalate	< 380	< 360	82 J	< 350	< 440	410,000 / 46,000
Butylbenzylphthalate	< 380	< 360	< 420	< 350	< 440	410,000,000 / 16,000,000
Carbazole	< 380	< 360	< 420	< 350	< 440	290,000 / 32,000
Chrysene	420 *	< 360	180 J	< 350	200 J	780,000 / 87,000
Dibenz(a,h)anthracene	< 380	< 360	< 420	< 350	< 440	780 / 87
Dibenzofuran	< 380	< 360	< 420	< 350	< 440	8,200,000 / 310,000
Di-n-butylphthalate	100 J *	< 360	< 420	< 350	< 440	200,000,000 / 7,800,000
Fluoranthene	670 *	< 360	300 J	< 350	300 J	82,000,000 / 3,100,000
Fluorene	< 380	< 360	< 420	< 350	< 440	82,000,000 / 3,100,000
Indeno(1,2,3-cd)pyrene	120 J *	< 360	94 J	< 350	88 J	7,800 / 870
2-Methylnaphthalene	< 380	< 360	< 420	< 350	< 440	41,000,000 / 1,600,000
Naphthalene	< 380	< 360	< 420	< 350	< 440	41,000,000 / 1,600,000
4-Nitroaniline	< 380	< 360	< 420	< 350	< 440	--- / ---
Phenanthrene	290 J *	< 360	160 J	< 350	150 J	--- / ---
Pyrene	670 *	< 360	270 J	< 350	300 J	61,000,000 2,300,000
<b>TIC's</b>						
Cholesterol	ND	ND	700 NJ	ND	ND	-
Chorophenothane	ND	ND	ND	ND	160 NJ	-
4-Cyclopentene-1,3-dione	ND	ND	ND	ND	1,200 NJ	-
Hexadecanoic acid	310 NJX	ND	1,100 NJX	120 NJX	670 NJX	-

Notes:

(1) EPA Region III RBC Criteria for Industrial/Residential Soils

(2) ND - Not detected

**bold dbl. underline** indicates concentration above RBC

\* - Result from duplicate sample

**Laboratory/Validation Qualifiers:**

J - Estimated value

N - Presumptive evidence of the compound based on the mass spectral library search

Y - Siloxane contaminant attributed to trap breakdown.

X - Designates a non-target which can be attributed to lab contamination

B - Indicates that this compound was present in the associated extraction blank

**TABLE 4-7  
SOIL RESULTS - PESTICIDES/PCBs (ug/kg)  
DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-001			SB34-002			SB34-003			SB34-004			EPA RBC Ind/Res <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	
alpha-Chlordane	< 2	< 2	< 2.2	< 4.1	< 1.9	< 2	< 94	< 1.8	1.1 JN	< 36	< 1.8	< 1.8	16,000 / 1,800
gamma-Chlordane	< 2	< 2	< 2.2	< 4.1	< 1.9	< 2	< 94	< 1.8	< 1.8	< 36	< 1.8	< 1.8	16,000 / 1,800
4,4'-DDD	< 3.8	< 3.8	< 4.2	23 J *	4.2 J	< 4	360 J	< 3.4	8.7 JN	230 J	< 3.4	5.4 JN	24,000 / 2,700
4,4'-DDE	< 3.8	< 3.8	< 4.2	840 CD *	37	< 4	<b>3,400 CD</b>	6 J	180 D	<b>4,600 CD</b>	19	190 D	17,000 / 1,900
4,4'-DDT	4.1 J	< 3.8	< 4.2	820 CD *	38	< 4	<b>12,000 CD</b>	6	99 D	<b>7,100 CD</b>	24	140 D	17,000 / 1,900
Endosulfan sulfate	< 3.8	< 3.8	< 4.2	23 *	< 3.6	< 4	< 180	< 3.4	5.5 JN	< 70	< 3.4	4.4 JN	--- / ---
Endrin ketone	5.2 J	< 3.8	< 4.2	< 8	< 3.6	< 4	< 180	< 3.4	< 3.6	< 70	< 3.4	< 3.5	--- / ---
Heptachlor	< 2	< 2	< 2.2	< 4.1	< 1.9	< 2	< 94	< 1.8	< 1.8	< 36	< 1.8	< 1.8	1,300 / 140
Methoxychlor	11 J	< 20	< 22	< 41	< 19	< 20	< 940	< 18	< 18	< 360	< 18	< 18	10,000,000 / 390,000

Parameters	SB34-005			SB34-006			SB34-007			SB34-008			EPA RBC Ind/Res <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	
alpha-Chlordane	0.97 J	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 3.9	< 1.8	< 1.8	5.3 J	2.8 JN	1.3 JN	16,000 / 1,800
gamma-Chlordane	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	1.7 JN	< 3.9	< 1.8	< 1.8	2.2	< 3.7	< 1.9	16,000 / 1,800
4,4'-DDD	< 3.5	< 3.4	< 3.5	< 3.5	< 3.5	< 3.5	18 J	< 3.6	< 3.6	110 J	30 JN	16 JN	24,000 / 2,700
4,4'-DDE	93 D	6	< 3.5	31 J	13 J	10 J	220 D	< 3.6	4.1 N	280 J	120 D	78	17,000 / 1,900
4,4'-DDT	150 D	8.6	< 3.5	29 J	17 J	16 J	720 CD	< 3.6	< 3.6	450 CD	280 CD	110 D	17,000 / 1,900
Endosulfan II	< 3.5	< 3.4	< 3.5	6.2 J	1.8 JN	< 3.5	< 7.5	< 3.6	< 3.6	< 3.8	< 7.2	< 3.7	12,000,000 / 470,000
Endosulfan sulfate	< 3.5	< 3.4	< 3.5	50 DJ	28 JN	24 J	< 7.5	< 3.6	< 3.6	2 J	< 7.2	< 3.7	--- / ---
Endrin ketone	< 3.5	< 3.4	< 3.5	< 3.5	< 3.5	< 3.5	< 7.5	< 3.6	< 3.6	2.5 J	1.9 J	< 3.7	--- / ---
Heptachlor	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 3.9	< 1.8	< 1.8	< 1.9	< 3.7	< 1.9	1,300 / 140
Methoxychlor	< 18	< 18	< 18	130	33 JN	20 P	< 39	< 18	< 18	< 19	< 37	< 19	10,000,000 / 390,000
<b>Aroclor 1260</b>	<b>&lt; 35</b>	<b>&lt; 34</b>	<b>&lt; 35</b>	<b>&lt; 35</b>	<b>&lt; 35</b>	<b>&lt; 35</b>	<b>&lt; 75</b>	<b>&lt; 36</b>	<b>&lt; 36</b>	<b>&lt; 37</b>	<b>&lt; 72</b>	<b>&lt; 37</b>	<b>2,900 / 320</b>

Parameters	SB34-009			SB34-010			SB34-011			SB34-012			EPA RBC Ind/Res <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 11 ft	0 - 6 in	3 - 4 ft	7 - 8ft	0 - 6 in	3 - 4 ft	7 - 8 ft	
alpha-Chlordane	270 DJ	< 1.9	< 1.8	< 1.9	< 1.8	< 1.9	< 2	< 1.8	< 1.8	< 2.1	< 1.8	< 3.1	16,000 / 1,800
gamma-Chlordane	290 D	< 1.9	< 1.8	< 1.9	< 1.8	< 1.9	< 2	< 1.8	< 1.8	< 2.1	< 1.8	< 3.1	16,000 / 1,800
4,4'-DDD	< 20	< 3.6	2 J	16	< 3.6	< 3.6	< 3.9	< 3.5	< 3.5	< 4.1	< 3.6	< 6.1	24,000 / 2,700
4,4'-DDE	800 CDJ	< 3.6	4.2 J	110 DJ	< 3.6	2.6 J	11 J *	< 3.5	< 3.5	< 8.4	< 3.6	< 6.1	17,000 / 1,900
4,4'-DDT	1,200 CD	< 3.6	4.8	120 D	< 3.6	3.2 J	5.9 J *	< 3.5	< 3.5	< 5	< 3.6	< 6.1	17,000 / 1,900
Endosulfan sulfate	28 JN	< 3.6	< 3.6	< 3.7	< 3.6	< 3.6	< 3.9	< 3.5	< 3.5	< 4.1	< 3.6	< 6.1	--- / ---
Endrin ketone	< 20	< 3.6	< 3.6	< 3.7	< 3.6	< 3.6	< 3.9	< 3.5	< 3.5	< 4.1	< 3.6	< 6.1	--- / ---
Heptachlor	5 J	< 1.9	< 1.8	< 1.9	< 1.8	< 1.9	< 2	< 1.8	< 1.8	< 2.1	< 1.8	< 3.1	1,300 / 140
Methoxychlor	< 110	< 19	< 18	< 19	< 18	< 19	< 20	< 18	< 18	< 21	< 18	< 31	10,000,000 / 390,000

Notes:

(1) EPA Region III RBC for industrial/residential soils

**bold dbi underline** indicates concentration above RBC

**Laboratory/Validation Qualifiers:**

L - Reported value may be biased low.  
D - Concentration from secondary dilution  
N - Tentative identification. Not confirmed by the lab.

J - Estimated value

R - Data rejected due to deviations from CLP methods.

C - Indicates compounds with a concentration that was confirmed by GC/MS

\* - Result from duplicate sample

**TABLE 4-7 (continued)**  
**SOIL RESULTS - PESTICIDES/PCBs (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-013			SB34-014			SB34-015		SB34-016		SB34-017		EPA RBC Ind/Res <sup>(1)</sup>
	0 - 6 in	3 - 4 ft	7 - 8 ft	0 - 6 in	3 - 4 ft	7 - 8 ft	0 - 6 in	4 - 6 ft	0 - 6 in	4 - 6 ft	0 - 6 in	4 - 6 ft	
alpha-Chlordane	1.4 JN	3.9 JN	< 1.9	< 2	< 1.9	< 2.2	< 2.2	< 1.8	< 2.2	< 2	< 2.2	< 2.0	16,000 / 1,800
gamma-Chlordane	< 4.1	< 3.7	< 1.9	< 2	< 1.9	< 2.2	< 2.2	< 1.8	< 2.2	< 2	< 2.2	< 2.0	16,000 / 1,800
4,4'-DDD	19 JN	23 JN	< 3.6	< 3.8	< 3.6	< 4.3	< 4.2	< 3.6	< 4.3	< 3.8	< 4.2	< 4.0	24,000 / 2,700
4,4'-DDE	460 CDJ	700 CD	27 J	5.7 J	< 3.6	< 4.3	< 4.2	< 3.6	11 J	< 3.8	40 L	< 4.0	17,000 / 1,900
4,4'-DDT	740 CD	1,100 D	26 J	3.7 J	< 3.6	< 4.3	3.9 JN	< 3.6	7 J	< 3.8	21 L	< 4.0	17,000 / 1,900
Endosulfan sulfate	< 7.9	< 7.2	< 3.6	< 3.8	< 3.6	< 4.3	< 4.2	< 3.6	< 4.3	< 3.8	< 4.2	< 4.0	--- / ---
Endrin ketone	< 7.9	< 7.2	< 3.6	< 3.6	< 4.3	< 4.2	< 3.6	< 4.3	< 3.8	< 3.8	< 4.2	< 4.0	--- / ---
Heptachlor	< 4.1	< 3.7	< 1.9	< 2	< 1.9	< 2.2	< 2.2	< 1.8	< 2.2	< 2	< 2.2	< 2.0	1,300 / 140
Methoxychlor	< 41	< 37	< 19	< 20	< 19	< 22	< 22	< 18	< 22	< 20	< 22	< 20	10,000,000 / 390,000

Parameters	SB34-018		SB34-019		SB34-020		SB34-023		SB34-024	SB34-025		EPA RBC Ind/Res <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	0 - 6 in	3 - 4 ft	0 - 6 in	3 - 4 ft	0 - 6 in	4 - 6 ft	0 - 6 in	0 - 6 in	4 - 6 ft	
alpha-Chlordane	< 2.1	< 2.2	< 2.4	< 2.1 *	< 2.3	< 2	1.8 L	< 1.8	< 1.8	< 2.0	< 1.8	16,000 / 1,800
gamma-Chlordane	< 2.1	< 2.2	< 2.4	< 2.1 *	< 2.3	< 2	1.3 J	< 1.8	< 1.8	< 2.0	< 1.8	16,000 / 1,800
4,4'-DDD	< 4.0	< 4.3	< 4.7	< 4.1 *	< 4.6	< 4	< 3.5	< 3.6	< 3.5	4.0 J	< 3.6	24,000 / 2,700
4,4'-DDE	19 J	< 4.3	7.8 P	< 4.1 *	17 J	< 4	9.4 J	< 3.6	26	120 D *	< 3.6	17,000 / 1,900
4,4'-DDT	21 J	< 4.3	4.2 JP	< 4.1 *	10 J	< 4	13 J	< 3.6	14	160 D	< 3.6	17,000 / 1,900
Endosulfan II	< 4.0	< 4.3	< 4.7	< 4.1 *	< 4.6	< 4	< 3.5	< 3.6	< 3.5	< 3.8	< 3.6	12,000,000 / 470,000
Endosulfan sulfate	< 4.0	< 4.3	< 4.7	< 4.1 *	< 4.6	< 4	< 3.5	< 3.6	< 3.5	6	< 3.6	--- / ---
Endrin ketone	< 4.0	< 4.3	< 4.7	< 4.1 *	< 4.6	< 4	< 3.5	< 3.6	< 3.5	4.3 *	< 3.6	--- / ---
Heptachlor	< 2.1	< 2.2	< 2.4	< 2.1 *	< 2.3	< 2	< 1.8	< 1.8	< 1.8	< 2.0	< 1.8	1,300 / 140
Methoxychlor	< 21	< 22	< 24	< 21 *	< 23	< 20	< 18	< 18	< 18	< 20	< 18	10,000,000 / 390,000
<b>Aroclor 1260</b>	<b>&lt; 40</b>	<b>&lt; 43</b>	<b>&lt; 47</b>	<b>&lt; 41 R</b>	<b>&lt; 46</b>	<b>&lt; 40</b>	<b>27 J</b>	<b>&lt; 36</b>	<b>&lt; 35</b>	<b>&lt; 38</b>	<b>&lt; 36</b>	<b>2,900 / 320</b>

Parameters	SB34-026		SB34-027		SB34-028		SB34-029	EPA RBC Ind/Res <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	0 - 6 in	4 - 6 ft	0 - 6 in	4 - 6 ft	0 - 6 in	
alpha-Chlordane	120	< 2.0	< 200	< 2.0	< 11	< 1.8	< 10	16,000 / 1,800
gamma-Chlordane	100	< 2.0	< 200	< 2.0	< 11	< 1.8	< 10	16,000 / 1,800
4,4'-DDD	< 78	< 3.8	970 CJ	2.1 J	< 21	< 3.5	< 20	24,000 / 2,700
4,4'-DDE	180	9.1	< 390	3.3 J	690 C	9.1	460 CL	17,000 / 1,900
4,4'-DDT	<b>2,100 CDJ</b>	210 D	<b>18,000 DJ*</b>	100 D	550 C	20	600 CL	17,000 / 1,900
Endosulfan sulfate	< 78	2.1 J	< 390	< 3.8	< 21	< 3.5	< 20	--- / ---
Endrin ketone	19 NJ	< 3.8	< 390	< 3.8	< 21	< 3.5	< 20	--- / ---
Heptachlor	< 40	< 2.0	< 200	< 2.0	< 11	< 1.8	< 10	1,300 / 140
Methoxychlor	< 400	< 20	< 2,000	< 20	< 110	< 18	< 100	10,000,000 / 390,000

Notes:

(1) EPA Region III RBC for industrial/residential soils

**bold dbi underline** indicates concentration above RBC

**Laboratory/Validation Qualifiers:**

L - Reported value may be biased low.

D - Concentration from secondary dilution

N - Tentative identification. Not confirmed by the lab.

J - Estimated value

R - Data rejected due to deviations from CLP methods.

C - Indicates compounds with a concentration that was confirmed by GC/MS

\* - Result from duplicate sample

**TABLE 4-8**  
**SOIL RESULTS - INORGANICS (mg/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-001			SB34-002			SB34-003	SB34-006			EPA RBC Ind/Res <sup>(1)</sup>
	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	4 - 6 ft	10 - 12 ft	0 - 6 in	0 - 6 in	4 - 6 ft	10 - 12 ft	
Aluminum	11,300	9,440	12,800	9,620 *	3,230	8,370	9,580	5,120	3,370	3,050	2,000,000 / 78,000
Antimony	< 0.23 L	< 0.22 L	< 0.24 L	< 0.24 L	< 0.16 L	< 0.24 L	0.36 L	< 0.2 L	< 0.19 L	< 0.17 L	820 / 31
Arsenic	<b><u>3.4</u></b>	<b><u>6.1</u></b>	<b><u>7.6</u></b>	<b><u>15.3</u></b>	<b><u>1.8</u></b>	<b><u>3.6</u></b>	<b><u>9.2</u></b>	<b><u>1.4</u></b>	<b><u>1.6</u></b>	<b><u>1.5</u></b>	3.8 / 0.43
Barium	33.9	21.7	33.3	47.1 *	7.3	30.7	32.7	17.8	11.6	10.9	140,000 / 5,500
Beryllium	0.35	0.38	0.43	0.47 *	< 0.16	0.44	0.52	0.37	< 0.19	< 0.17	4,100 / 160
Cadmium	< 0.23	< 0.22	< 0.24	0.55	< 0.16	< 0.24	0.61	0.97	< 0.19	< 0.17	1,000 / 39
Calcium	1,240	1,190	1,000	2,680 *	189	495	4,200	2,750	322	315	--- / ---
Chromium	13.8	13.3	23.6	20.5 *	4.8	12.9	20	17.4	6	7.4	6,100 / 230
Cobalt	4.7	4.9	3.4	5.9	1.5	4.1	6.5	3.8	1.6	2.1	120,000 / 4,700
Copper	17.9	7.2	9	25.5	2.2	6.9	20.6	9.7	2.8	2.7	82,000 / 3,100
Cyanide	< 0.39	< 0.56	< 0.53	< 0.49	< 0.46	< 0.32	< 0.34	< 0.4	< 0.43	< 0.36	41,000 / 1,600
Iron	11,100	13,900	23,000	13,000 *	2,030	13,300	15,200	8,390	2,620	2,770	610,000 / 23,000
Lead	19.3	7.4	9.7	239	6.2 J	7.7 J	215	102	9.8 J	12.9 J	1,200 / 400
Magnesium	659	540	1,260	2,980	264	1,120	4,880	2,830	456	452	--- / ---
Manganese	149	90	63.6	272	18.4	89.5	333	169	23.8	39.3	41,000 / 1,600
Mercury	< 0.11	< 0.10	< 0.12	< 0.12	< 0.09	< 0.11	< 0.08	< 0.08	< 0.10	< 0.09	--- / ---
Nickel	8.5	5.6	5	10.4 *	1.9	6.4	9.3	6.2 B	2.4	3	41,000 / 1,600
Potassium	825	714	1,500	1,100 *	305	905	936	725	370	295	--- / ---
Selenium	0.73	< 0.44	0.62	0.86 *	0.31	0.52	< 0.36	< 0.4	< 0.38	< 0.34	10,000 / 390
Silver	< 0.23 L	< 0.22 L	< 0.24 L	< 0.24 L	< 0.16 L	< 0.24 L	< 0.18 L	< 0.2 L	< 0.19 L	< 0.17 L	10,000 / 390
Sodium	< 28.7	< 27.2	< 29.9	46.1 B *	19.2	29.2	33.4	29.5 B	23.1	21.2	--- / ---
Thallium	0.74	0.72	0.66	0.52	0.33	0.59	0.37	< 0.4	< 0.38	< 0.34	140 / 5.5
Vanadium	23.9	22.6	34.9	33.7 *	6.5	21.6	25.8	13.8	7.9	6.6	14,000 / 550
Zinc	34.6	20.2	25.2	306	10.7	28.7	77	83.4	12.3	12	610,000 / 23,000

Notes:

(1) EPA Region III Risk-based Concentration  
Criteria for Industrial/Residential Soils

**bold dbl. underline** indicates concentration  
above risk screening criteria

\* - Result from duplicate sample

**Laboratory/Validation Qualifiers:**

J - Estimated value

B - Compound was detected in the associated QA blank.

L - Reported value may be biased low.

K - Reported value may be biased high.

**TABLE 4-8 (continued)**  
**SOIL RESULTS - INORGANICS (mg/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-009			SB34-012			SB34-014			SB34-017	EPA RBC Ind/Res <sup>(1)</sup>
	0 to 6 in	4 to 6 ft	10 to 12 ft	0 to 6 in	3 to 4 ft	7 to 8 ft	0 to 6 in	3 to 4 ft	7 to 8 ft	0 to 6 in	
Aluminum	9,420	6,680	2,790	5,810	3,740	2,930	5,080	1,990	3,900	15,700	2,000,000 / 78,000
Antimony	0.52 L	< 0.20 L	< 0.16 L	< 0.22 L	< 0.17 L	< 0.21 L	< 0.22 L	< 0.21 L	< 0.25 L	< 0.24 L	820 / 31
Arsenic	<b><u>17</u></b>	<b><u>2.8</u></b>	<b><u>1.9</u></b>	<b><u>2.6</u></b>	<b><u>1.1</u></b>	<b><u>0.7</u></b>	<b><u>2</u></b>	< 0.64	<b><u>1.2</u></b>	<b><u>9.9</u></b>	3.8 / 0.43
Barium	37.8	22.8	9.9	24.9	39.2	26.1	35.1	14.9	18.4	45.4	140,000 / 5,500
Beryllium	0.79	0.25	0.19	0.23	0.33	0.21	0.28	< 0.21	< 0.25	0.38	4,100 / 160
Cadmium	0.61	< 0.20	< 0.16	< 0.22	< 0.17	< 0.21	< 0.22	< 0.21	< 0.25	< 0.24	1,000 / 39
Calcium	31,500 J	279	118 B	454	149 B	151 B	240 B	123 B	202 B	385	--- / ---
Chromium	27.8 K	6.8	5	8.6	5.1	5	6.2 K	4.4 K	6.6 K	17.3	6,100 / 230
Cobalt	6.3	2.4	5.9	1.5	2.4	1.6	2.1	0.79	3.3	4	120,000 / 4,700
Copper	42.3	3.2	1.9	3.9	2.5	1.7	3.8	1.2	1.9	7.6	82,000 / 3,100
Cyanide	0.34	< 0.43	< 0.51	< 0.36	< 0.38	< 0.37	< 0.40	< 0.33	< 0.40	< 0.54	41,000 / 1,600
Iron	23,000	6,420	3,740	7,620	4,750	3,350	5,540	2,030	4,330	14,000	610,000 / 23,000
Lead	134	4.9 J	3.3 J	13.4	4.5	4.2	25.7	2.7	4.4	44.1	1,200 / 400
Magnesium	4,180	439	193	362	277	247	355	197	360	948	--- / ---
Manganese	375 K	40.5	58.8	56.4	173	95	130 K	26.6 K	86.4 K	77.8	41,000 / 1,600
Mercury	< 0.09	< 0.10	< 0.09	< 0.12	< 0.09	< 0.09	< 0.09	< 0.09	< 0.12	< 0.12	--- / ---
Nickel	17.9	3.4	2.7	3.3	2.7	2	3.5	1.8	3.2	8.7	41,000 / 1,600
Potassium	1,430 E	429	217	392	213	214	279 J	203 J	387 J	896	--- / ---
Selenium	0.47	< 0.40	0.38	0.45	< 0.34	< 0.42	< 0.44	< 0.42	< 0.51	1.3	10,000 / 390
Silver	< 0.21 L	< 0.20 L	< 0.16 L	< 0.22 L	< 0.17 L	< 0.21 L	< 0.22 L	< 0.21 L	< 0.25 L	< 0.24 L	10,000 / 390
Sodium	447	24.5	< 20.1	< 27.2	< 21.2	< 25.9	< 27.2	< 26	< 31.3	29.8	--- / ---
Thallium	< 0.43	0.52	0.33	0.53	< 0.34	< 0.42	< 0.44	0.43 B	0.52 B	< 0.48	140 / 5.5
Vanadium	22	13.4	7.8	15.6	8.2	7.4	13.7	5	9	41.5	14,000 / 550
Zinc	311	12.9	9.1	15.4	10.2	8.1	17.3 B	5.7 B	11.2 B	31	610,000 / 23,000

Notes:

(1) EPA Region III Risk-based Concentration  
Criteria for Industrial/Residential Soils  
**bold dbl. underline** indicates concentration  
above risk screening criteria

**Laboratory/Validation Qualifiers:**

J - Estimated value  
B - Compound was detected in the associated QA blank.  
L - Reported value may be biased low.  
K - Reported value may be biased high.

**TABLE 4-9  
SOIL RESULTS - LEAD (mg/kg)  
DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SB34-004		SB34-005		SB34-007		SB34-008		SB34-010		EPA RBC Ind/Res <sup>(1)</sup>
	0 to 6 in	4 to 6 ft	0 to 6 in	4 to 6 ft	0 to 6 in	4 to 6 ft	0 to 6 in	4 to 6 ft	0 to 6 in	4 to 6 ft	
Lead	35.1 J	2.6 J	15.7	2.5 J	24.1 J	2.2 J	91 *	3.2	106	3.6	1,200 / 400

Parameters	SB34-011	SB34-013	SB34-015	SB34-016	SB34-018	SB34-019	SB34-020	SB34-021		EPA RBC Ind/Res <sup>(1)</sup>
	0 to 6 in	4 to 6 ft								
Lead	22.6	31.2	18.5	24.3	47.1	16.6	26.1	15.4	51.5	1,200 / 400

Parameters	SB34-022		SB34-025		SB34-028		SB34-029				EPA RBC Ind/Res <sup>(1)</sup>
	0 to 6 in	4 to 6 ft	0 to 6 in	4 to 6 ft	0 to 6 in	4 to 6 ft	0 to 6 in				
Lead	44.5	5.7	227 J	2.6 J	122	2.9	64.3				1,200 / 400

Notes:

(1) EPA Standards for Lead in Soil, OPPT Lead Programs, 1/2/2001

**bold dbl. underline** indicates concentration above risk screening criteria

\* - Result from duplicate sample

**TABLE 4-10**  
**SEDIMENT RESULTS - VOLATILE ORGANICS (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-001	SD34-002	SD34-003	SD34-004	SD34-005	SD34-006	SD34-007	SD34-008	SD34-009	BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
Acetone	< 12	< 12	< 12	13	8 J	7 J	< 13	< 14	< 16	-	200,000,000 / 7,800,000
Toluene	< 12	< 12	< 12	< 12	< 12	6 J	< 13	< 14	< 16	- /100	410,000,000 / 16,000,000
<b>TIC's</b>											
Cyclotetrasiloxane	ND <sup>(3)</sup>	26 NJY	140 NJY	11 NJY	NT	ND	ND	ND	ND	-	-
alpha-Pinene	ND	ND	ND	12 NJ	12 NJ	ND	ND	ND	22 NJ	-	-
1-Propanol	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-

Parameters	SD34-010	SD34-011	SD34-012	SD34-013	SD34-014	SD34-015	SD34-016	SD34-017		BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
Acetone	< 15	9 J	16 J *	< 13	11 J	< 15	< 14	< 13		-	200,000,000 / 7,800,000
Toluene	< 15	< 15	< 20	< 13	< 13	< 15	< 14	< 13		- /100	410,000,000 / 16,000,000
<b>TIC's</b>											
Cyclotetrasiloxane	ND	71 NJY	ND	ND	ND	10 NJY	ND	ND		-	-
alpha-Pinene	24 NJ	220 NJ	230 NJ	ND	ND	ND	33 NJ	ND		-	-
1-Propanol	12 NJ	ND		-	-						

Notes:

- (1) EPA BTAG Levels (Flora/Fauna) for Sediment
- (2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils
- (3) ND - Not detected
- \* - Result from duplicate sample

**Laboratory/Validation Qualifiers:**

- J - Estimated value
- N - Presumptive evidence of the compound based on the mass spectral library search
- Y - Siloxane contaminant attributed to trap breakdown.

**TABLE 4-11**  
**SEDIMENT RESULTS - SEMIVOLATILE ORGANICS (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-001	SD34-002	SD34-003	SD34-004	SD34-005	SD34-006	SD34-007	SD34-008	BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
Anthracene	< 400	< 390	< 390	< 390	72 J *	< 450	< 410	< 440	- / 85.3	610,000,000/23,000,000
Benzo(a)anthracene	< 400	82 J	< 390	73 J	<b>590 *</b>	< 450	< 410	< 440	- / 261	7,800 / 870
Benzo(a)pyrene	< 400	67 J	< 390	<b>100 J</b>	<b>690 *</b>	< 450	< 410	< 440	- / 430	780 / 87
Benzo(b)fluoranthene	< 400	110 J	41 J	120 J	810 *	< 450	< 410	< 440	- / 3,200	7,800 / 870
Benzo(g,h,i)perylene	< 400	43 J	< 390	80 J	400 *	< 450	< 410	< 440	- / 670	-
Benzo(k)fluoranthene	< 400	92 J	< 390	<b>120 J</b>	<b>570</b>	< 450	< 410	< 440	- / 100	78,000 / 8,700
Chrysene	< 400	130 J	< 390	100 J	<b>690 *</b>	< 450	< 410	< 440	- / 384	780,000 / 87,000
Dibenz(a,h)anthracene	< 400	< 390	< 390	< 390	<b>260 J *</b>	< 450	< 410	< 440	- / 63.4	780 / 87
Di-n-butylphthalate	< 400	<b>1,900</b>	69 J	1,100	410	100 J	190 J	< 440	1,400	200,000,000/7,800,000
Fluoranthene	< 400	180 J	60 J	150 J	<b>1000 *</b>	< 450	< 410	< 440	- / 600	82,000,000/3,100,000
Indeno(1,2,3-cd)pyrene	< 400	46 J	< 390	73 J	430 *	< 450	< 410	< 440	- / 600	7,800 / 880
Phenanthrene	< 400	68 J	< 390	< 390	350 J *	< 450	< 410	< 440	- / 240	-
Pyrene	< 400	130 J	44 J	98 J	<b>880 *</b>	< 450	< 410	< 440	- / 665	61,000,000/2,300,000
<b>TIC's</b>										
9,10-Anthracenedione	ND	ND	ND	ND	120 NJ	ND	ND	ND	-	-
Benzoic Acid	ND	ND	ND	ND	ND	300 NJ	ND	ND	650	8.2E+09/310,000,000
Caryophyllene	ND	ND	ND	ND	ND	ND	ND	ND	-	-
Cinnamyl cinnamate	ND	ND	ND	ND	130 NJ	1,500 NJ	ND	ND	-	-
Hexadecanoic acid	ND	350 NJX	180 NJX	280 NJX	180 NJX	660 NJX	350 NJX	100 NJX	-	-
Octadecanoic Acid	ND	ND	ND	ND	ND	110 NJ	ND	ND	-	-
Oleic Acid	ND	ND	ND	ND	ND	440 NJ	ND	ND	-	-
1-Phenanthrenecarboxylic Acid	ND	ND	ND	ND	ND	ND	ND	ND	-	-
Propenoic Acid Isomers	ND	ND	ND	ND	ND	500 NJ	ND	ND	-	-

Notes:

- (1) EPA BTAG levels (flora/fauna) for sediment
- (2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils
- (3) ND - Not detected

**Bold double underline**

indicates 'concentration above BTAG or RBC values

\* - Result from duplicate sample

**Laboratory/Validation Qualifiers:**

- J - Estimated value
- N - Presumptive evidence of the compound based on the mass spectral library search
- R - Data rejected due to severe deviations in CLP methods.
- X - Designates a non-target which can be attributed to lab contamination

**TABLE 4-11 (continued)**  
**SEDIMENT RESULTS - SEMIVOLATILE ORGANICS (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-009	SD34-010	SD34-011	SD34-012	SD34-013	SD34-014	SD34-015	SD34-016	SD34-017	BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
Anthracene	< 540	< 480	< 510	< 640	< 440	< 600	< 510	< 460	< 420	- / 85.3	610,000,000/23,000,000
Benzo(a)anthracene	< 540	49 J	74 J	< 640	< 440	< 600	< 510	< 460	< 420	- / 261	7,800 / 870
Benzo(a)pyrene	< 540	62 J	87 J	61 J *	< 440	< 600	< 510	< 460	< 420	- / 430	780 / 87
Benzo(b)fluoranthene	< 540	76 J	110 J	63 J *	< 440	< 600	< 510	< 460	< 420	- / 3,200	7,800 / 870
Benzo(g,h,i)perylene	< 540	< 480	58 J	< 640	< 440	< 600	< 510	< 460	< 420	- / 670	-
Benzo(k)fluoranthene	< 540	52 J	81 J	< 640	< 440	< 600	< 510	< 460	< 420	- / 100	78,000 / 8,700
Chrysene	< 540	65 J	100 J	68 J *	< 440	< 600	< 510	< 460	< 420	- / 384	780,000 / 87,000
Dibenz(a,h)anthracene	< 540	< 480	< 510	< 640	< 440	< 600	< 510	< 460	< 420	- / 63.4	780 / 87
Di-n-butylphthalate	< 540	< 480	91 J	86 J *	51 J	68 J	< 510	61 J	72 R	1,400	200,000,000/7,800,000
Fluoranthene	81 J	120 J	200 J	130 J *	< 440	< 600	< 510	< 460	< 420	- / 600	82,000,000/3,100,000
Indeno(1,2,3-cd)pyrene	< 540	< 480	57 J	< 640	< 440	< 600	< 510	< 460	< 420	- / 600	7,800 / 870
Phenanthrene	< 540	< 480	100 J	67 J *	< 440	< 600	< 510	< 460	< 420	- / 240	-
Pyrene	66 J	92 J	160 J	100 J *	< 440	< 600	< 510	< 460	< 420	- / 665	61,000,000/2,300,000
9,10-Anthracenedione	ND	-	-								
Benzoic Acid	ND	650	8.2E+09/310,000,000								
Caryophyllene	ND	ND	ND	ND	140 NJ	690 NJ	ND	ND	ND	-	-
Cinnamyl cinnamate	490 NJ	1,800 NJ	ND	ND	590 NJ	1,700 NJ	3,800 NJ	460 NJ	ND	-	-
Hexadecanoic acid	130 NJX	310 NJX	240 NJX	ND	160 NJX	140 NJX	140 NJX	ND	200 NJX	-	-
Octadecanoic Acid	ND	-	-								
Oleic Acid	ND	-	-								
1-Phenanthrenecarboxylic Acid	ND	ND	ND	ND	ND	540 NJ	ND	ND	ND	-	-
Propenoic Acid Isomers	ND	-	-								

Notes:

- (1) EPA BTAG levels (flora/fauna) for sediment
- (2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils
- (3) ND - Not detected

**Laboratory/Validation Qualifiers:**

- J - Estimated value
- N - Presumptive evidence of the compound based on the mass spectral library search
- R - Data rejected due to severe deviations in CLP methods.
- X - Designates a non-target which can be attributed to lab contamination

**Bold double underline**

indicates concentration above BTAG or RBC values

\* - Result from duplicate sample

**TABLE 4-12**  
**SEDIMENT RESULTS - PESTICIDES/PCBs (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-001	SD34-002		SD34-003	SD34-004		SD34-005	SD34-006		BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
	0 - 6 in	0 - 6 in	2 - 3 ft	0 - 6 in	0 - 6 in	2 - 3 ft	0 - 6 in	0 - 6 in	2 - 3 ft		Ind/Res
alpha-Chlordane	18 J	< 20	< 1.9	< 4	5.2	< 1.9	< 10	< 23	< 2.2	- / 100	16,000 / 1,800
gamma-Chlordane	9.4 J	< 20	< 1.9	3 J	4.7	< 1.9	3.1 *	< 23	< 2.2	- / 100	16,000 / 1,800
4,4'-DDD	<u>69 JN</u>	<u>160 J</u>	< 3.6	<u>30 J</u>	11 J	< 3.6	<u>70</u>	<u>1,100 CD</u>	< 4.2	- / 16	24,000/2,700
4,4'-DDE	<u>140 J</u>	<u>250</u>	< 3.6	<u>96</u>	<u>24</u>	< 3.6	<u>320</u>	<u>110</u>	< 4.2	- / 2.2	17,000/1,900
4,4'-DDT	<u>6,600 CD</u>	<u>1,100 CD</u>	< 3.6	<u>270 D</u>	<u>250 D</u>	<u>5.4 J</u>	<u>610 CD</u>	<u>1,900 CD</u>	< 4.2	- / 1.58	17,000/1,900
Endosulfan sulfate	< 80	< 39	< 3.6	< 7.7	1.4 JN	< 3.6	7.7 J *	< 45	< 4.2	-	--- / ---
Endrin	< 80	< 39	< 3.6	3.7 JN	< 3.9	< 3.6	< 20	< 45	< 4.2	- / 100	610,000/23,000
Endrin ketone	< 80	< 39	< 3.6	< 7.7	3.9	< 3.6	< 20	< 45	< 4.2	- / 100	--- / ---
Heptachlor epoxide	< 41	< 20	< 1.9	< 4	0.79 JN	< 1.9	< 10	< 23	< 2.2	- / 100	630/70
Methoxychlor	< 410	< 200	< 19	< 40	< 20	< 19	< 100	< 230	< 22	- / 100	10,000,000/390,000

Parameters	SD34-007		SD34-008		SD34-009		SD34-010		SD34-011	BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
	0 - 6 in	2 - 3 ft	0 - 6 in	2 - 3 ft	0 - 6 in	2 - 3 ft	0 - 6 in	2 - 3 ft	0 - 6 in		Ind/Res
alpha-Chlordane	< 2.1	< 2.2	< 2.3	< 2.1	< 2.8	< 2.2	< 2.5	< 2.2	< 2.6	- / 100	16,000 / 1,800
gamma-Chlordane	< 2.1	< 2.2	< 2.3	< 2.1	< 2.8	< 2.2	1.6 J	< 2.2	2 J	- / 100	16,000 / 1,800
4,4'-DDD	5.4	<u>80 D</u>	<u>50</u>	6.5	<u>38 J</u>	4.4 J	<u>52 J</u>	< 4.2	<u>31 J</u>	- / 16	24,000/2,700
4,4'-DDE	<u>4.2 JN</u>	<u>4.8 J</u>	<u>52 J</u>	< 4.1	<u>87 J</u>	<u>2.6 J</u>	<u>230 D</u>	< 4.2	<u>79 J</u>	- / 2.2	17,000/1,900
4,4'-DDT	<u>3.5 J</u>	<u>4.2 J</u>	<u>260 D</u>	< 4.1	<u>200 DJ</u>	< 4.2	<u>69 J</u>	< 4.2	<u>110 DJ</u>	- / 1.58	17,000/1,900
Endosulfan sulfate	< 4.1	< 4.2	< 4.4	< 4.1	< 5.4	< 4.2	< 4.8	< 4.2	< 5.1	-	--- / ---
Endrin	< 4.1	< 4.2	< 4.4	< 4.1	< 5.4	< 4.2	< 4.8	< 4.2	< 5.1	- / 100	610,000/23,000
Endrin ketone	< 4.1	< 4.2	< 4.4	< 4.1	< 5.4	< 4.2	< 4.8	< 4.2	< 5.1	- / 100	--- / ---
Heptachlor epoxide	< 2.1	< 2.2	< 2.3	< 2.1	< 2.8	< 2.2	< 2.5	< 2.2	< 2.6	- / 100	630/70
Methoxychlor	< 21	< 2	< 23	< 21	< 28	< 22	< 25	< 22	< 26	- / 100	10,000,000/390,000

Notes:

- (1) EPA BTAG levels (flora/fauna) for sediment
- (2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils

Laboratory/Data Validation Qualifiers:

- J - Estimated value
- N - Tentative identification. Not confirmed by the lab.
- C - Indicates compound concentration was confirmed by GC/MS
- D - Concentration from secondary dilution

\* - Result from duplicate sample

**TABLE 4-12 (continued)**  
**SEDIMENT RESULTS - PESTICIDES/PCBs (ug/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-012		SD34-013	SD34-014	SD34-015	SD34-016	SD34-017	SD34-018		BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup> Ind/Res
	0 - 6 in	2 - 3 ft	0 - 6 in	0 - 6 in	0 - 6 in	2 - 3 ft					
alpha-Chlordane	< 3.3	< 2.4	< 2.2	< 3.1	< 2.6	< 2.3	< 2.1	< 2.1	< 2.7	- / 100	16,000 / 1,800
gamma-Chlordane	2.6 J	< 2.4	< 2.2	< 3.1	< 2.6	< 2.3	< 2.1	< 2.1	< 2.7	- / 100	16,000 / 1,800
4,4'-DDD	<b>64 *</b>	9.4	10 J	7.4 J	11 J	4.7 JN	<b>56 J</b>	< 4.1	< 5.3	- / 16	24,000/2,700
4,4'-DDE	<b>530 CD *</b>	<b>5.2 J</b>	<b>18 J</b>	<b>52 J</b>	<b>21 J</b>	<b>4.4 J</b>	<b>16</b>	< 4.1	< 5.3	- / 2.2	17,000/1,900
4,4'-DDT	<b>460 CDJ</b>	< 4.7	<b>16</b>	<b>34 J</b>	< 5.1	<b>6 J</b>	<b>5.2</b>	<b>7</b>	< 5.3	- / 1.58	17,000/1,900
Endosulfan sulfate	10	< 4.7	< 4.4	< 6	< 5.1	< 4.6	< 4.1	< 4.1	< 5.3	-	--- / ---
Endrin	< 5.1	< 4.7	< 4.4	< 6	< 5.1	< 4.6	< 4.1	< 4.1	< 5.3	- / 100	610,000/23,000
Endrin ketone	5.1 J	< 4.7	< 4.4	< 6	< 5.1	< 4.6	< 4.1	< 4.1	< 5.3	- / 100	--- / ---
Heptachlor epoxide	< 3.3	< 2.4	< 2.2	< 3.1	< 2.6	< 2.3	< 2.1	< 2.1	< 2.7	- / 100	630/70
Methoxychlor	11 J	< 24	< 22	< 31	< 26	< 23	< 21	< 21	< 27	- / 100	10,000,000/390,000

Parameters	SD34-019	SD34-020		SD34-021	SD34-022		SD34-023		BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup> Ind/Res
	0 - 6 in	0 - 6 in	2 - 3 ft	0 - 6 in	0 - 6 in	2 - 3 ft	0 - 6 in	2 - 3 ft		
alpha-Chlordane	< 5.8	< 4	< 2	< 10	< 2.6	< 2.5	< 2.4	< 2.1	- / 100	16,000 / 1,800
gamma-Chlordane	< 5.8	< 4	< 2	< 10	< 2.6	< 2.5	< 2.4	< 2.1	- / 100	16,000 / 1,800
4,4'-DDD	6.3 J	< 7.8	< 4	< 19	2.6 J	12	< 4.6	< 4.1	- / 16	24,000/2,700
4,4'-DDE	<b>32 J</b>	<b>11 J</b>	< 4	<b>35 J</b>	<b>12</b>	<b>4.1 J</b>	<b>3.2 J</b>	< 4.1	- / 2.2	17,000/1,900
4,4'-DDT	<b>20 J</b>	< 7.8	< 4	< 19	<b>56</b>	<b>2.6 J</b>	<b>3.9 J</b>	< 4.1	- / 1.58	17,000/1,900
Endosulfan sulfate	< 11	< 7.8	< 4	< 19	< 5.1	< 4.8	< 4.6	< 4.1	-	--- / ---
Endrin	< 11	< 7.8	< 4	< 19	< 5.1	< 4.8	< 4.6	< 4.1	- / 100	610,000/23,000
Endrin ketone	< 11	< 7.8	< 4	< 19	< 5.1	< 4.8	< 4.6	< 4.1	- / 100	--- / ---
Heptachlor epoxide	< 5.8	< 4	< 2	< 10	< 2.6	< 2.5	< 2.4	< 2.1	- / 100	630/70
Methoxychlor	< 58	< 40	< 20	< 100	< 26	< 25	< 24	< 21	- / 100	10,000,000/390,000

Notes:

- (1) EPA BTAG levels (flora/fauna) for sediment
- (2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils

**Laboratory/Data Validation Qualifiers:**

- J - Estimated value
- N - Tentative identification. Not confirmed by the lab.
- C - Indicates compound concentration was confirmed by GC/MS
- D - Concentration from secondary dilution

\* - Result from duplicate sample

**TABLE 4-13  
SEDIMENT RESULTS - INORGANICS (mg/kg)  
DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-001	SD34-002		SD34-003	SD34-004		SD34-005	SD34-006		BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup> (Ind/Res)
	0 - 6 in	0 - 6 in	2 - 3 ft	0 - 6 in	0 - 6 in	2 - 3 ft	0 - 6 in	0 - 6 in	2 - 3 ft		
Aluminum	15,300 J	8,300 J	6240	5,560 J	3,970 J	4310	3,550 J *	2,110 J	3350	--- / ---	2,000,000/78,000
Antimony	< 0.15 L	< 0.20 L	< 0.43	< 0.20 L	< 0.20 L	< 0.44	< 0.18 L	< 0.20 L	< 0.46	--- / 150	820 / 31
Arsenic	<b><u>6.8</u></b>	<b><u>14.8</u></b>	<b><u>3.1</u></b>	<b><u>29.6</u></b>	<b><u>17.3</u></b>	<b><u>2.4</u></b>	<b><u>6.3</u></b> *	< 0.59	<b><u>1.1</u></b>	8.2 / 8.2	3.8 / 0.43
Barium	50	31.3	20.1	37.1	32.4	55.7	23.8 *	15.7	15.4	--- / ---	140,000 / 5,500
Beryllium	0.41	0.43	0.36	0.42	0.39	0.54	0.3 *	< 0.20	< 0.23	--- / ---	4,100 / 160
Cadmium	< 0.15	< 0.20	< 0.21	< 0.20	< 0.20	< 0.22	< 0.18	< 0.20	< 0.23	5.1 / 1.2	1,000 / 39
Calcium	1,010	859 B	393	628	853	302	663 *	361	265	--- / ---	--- / ---
Chromium	<b><u>15.6</u></b> J	<b><u>16.1</u></b> J	<b><u>6.7</u></b>	<b><u>12.5</u></b> J	<b><u>9.7</u></b> J	<b><u>4.9</u></b>	<b><u>11.8</u></b> J *	<b><u>2.1</u></b> J	<b><u>5.6</u></b>	0.005 / 260	6,100 / 230
Cobalt	3.4	3.2	1.9	3.1	2.6	2.6	2.3 *	0.46	1.2	--- / ---	120,000 / 4,700
Copper	7.3	15	2.5	8.8	9.1	3.5	5.7	0.76 B	1.7	--- / 34	82,000 / 3,100
Cyanide	< 0.39	< 0.46	-	< 0.42	< 0.55	-	< 0.40	< 0.49	-	--- / ---	41,000/1,600
Iron	16,900 J	11,700 J	6,990	6,270 J	5,430 J	4340	5,310 J *	557 J	1000	--- / ---	610,000 / 23,000
Lead	10.1	35.8	4.7	19.8	36.2	7.1	<b><u>99.6</u></b> *	11	4.3	--- / 46.7	400
Magnesium	712	1,260	328	527	489	302	671 *	139	197	--- / ---	--- / ---
Manganese	77.1	146	31.3	283	288	374	180	7.2	5.5	--- / ---	41,000 / 1,600
Mercury	< 0.10	< 0.09	< 0.10	< 0.09	< 0.11	< 0.09	< 0.09	< 0.14	< 0.10	0.15 / 0.15	--- / ---
Nickel	6.8	6.2	3.5	4.2	3.5	3.7	3.4 *	1.3	3.1	20.9 / 20.9	41,000/1,600
Potassium	778 J	582 J	356	420 J	333 J	264	297 J *	130 J	238	--- / ---	--- / ---
Selenium	< 0.30	< 0.41	< 0.43	< 0.41	< 0.40	< 0.44	0.47	< 0.39	< 0.46	--- / ---	10,000 / 390
Silver	< 0.15 L	< 0.20 L	< 0.21	< 0.20 L	< 0.20 L	< 0.22	< 0.18 L	< 0.20 L	< 0.23	--- / 1	10,000/390
Sodium	< 18.5	< 25	27.1	< 25.1	< 24.9	19.5	< 21.6	< 24.3	25.6	--- / ---	--- / ---
Thallium	0.33	< 0.41	< 0.65	< 0.41	< 0.40	< 0.44	0.46 *	< 0.39	< 0.46	--- / ---	140 / 5.5
Vanadium	28.4	21	13.1	15.2	12.5	7.4	14.3 *	4.6	6.6	--- / ---	14,000 / 550
Zinc	351	245	17.3	228	242	34.8	81.3 *	4.6 B	9.1	--- / 150	610,000 / 23,000

Notes:

(1) EPA BTAG levels (flora/fauna) for sediment

(2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils

**bold dbl. underline** indicates concentration above risk screening criteria

\* - Results from duplicate sample

**Laboratory/Validation Qualifiers:**

L - Reported value may be biased low.

B - Compound was detected in associated QC blank.

R - Rejected value due to severe deviations in CLP methods.

J - Estimated value.

**TABLE 4-13 (continued)**  
**SEDIMENT RESULTS - INORGANICS (mg/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-007		SD34-008		SD34-009		SD34-010		SD34-011	BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup> (Ind/Res)
	0 - 6 in	2 - 3 ft	0 - 6 in	2 - 3 ft	0 - 6 in	2 - 3 ft	0 - 6 in	2 - 3 ft	0 - 6 in		
Aluminum	8,070 J	3210	2360 J	4650	2,790 J	3100	5,790 J	4950	4,050 J	--- / ---	2,000,000/78,000
Antimony	< 0.23 L	< 0.43	< 0.18 L	< 0.43	< 0.34 L	< 0.49	< 0.25 L	< 0.39	< 0.27 L	--- / 150	820 / 31
Arsenic	< 0.69	<b><u>0.56</u></b>	<b><u>1.1</u></b>	<b><u>0.74</u></b>	<b><u>2.3</u></b>	< 0.49	<b><u>4.1</u></b>	< 0.39	<b><u>2.9</u></b>	8.2 / 8.2	3.8 / 0.43
Barium	38.1	44.7	15.7	33.9	18.8	21.1	29.4	29.8	32.5	--- / ---	140,000 / 5,500
Beryllium	0.24	0.29	0.18	0.24	0.38	< 0.25	0.42	< 0.20	0.33	--- / ---	4,100 / 160
Cadmium	< 0.23	< 0.22	< 0.18	< 0.21	< 0.34	< 0.25	< 0.25	< 0.20	< 0.27	5.1 / 1.2	1,000 / 39
Calcium	494	421	271	442	653	253	727	281	1,330	--- / ---	--- / ---
Chromium	<b><u>8.9 J</u></b>	<b><u>5.8</u></b>	<b><u>3.6 J</u></b>	<b><u>5</u></b>	<b><u>5.5 J</u></b>	<b><u>3.3</u></b>	<b><u>8.3 J</u></b>	<b><u>5.5</u></b>	<b><u>6 J</u></b>	0.005 / 260	6,100 / 230
Cobalt	0.92	0.55	0.69	0.66	1.5	0.43	3.8	0.87	3.6	--- / ---	120,000 / 4,700
Copper	1.8	2.4	7	2.9	13.4	1.5	22.2	1.5	32.7	--- / 34	82,000 / 3,100
Cyanide	< 0.50	-	< 0.46	-	< 0.73	-	< 0.61	-	< 0.55	--- / ---	41,000/1,600
Iron	1,780 J	909	1,690 J	1370	3,820 J	861	6,350 J	1840	5,550 J	--- / ---	610,000 / 23,000
Lead	7.6	7.4	10.5	6.9	29.1	4.6	38.2	6.3	<b><u>60.1</u></b>	--- / 46.7	400
Magnesium	347	208	169	236	291	164	542	383	437	--- / ---	--- / ---
Manganese	13.2	4.3	13.3	6.7	55.7	5.9	92	11.3	181	--- / ---	41,000 / 1,600
Mercury	< 0.12	< 0.12	< 0.11	< 0.12	< 0.16	< 0.07	< 0.12	< 0.06	< 0.14	0.15 / 0.15	--- / ---
Nickel	3.4	2.7	1.8	2.5	2.6	1.5	4.4	2.9	3.7	20.9 / 20.9	41,000/1,600
Potassium	369 J	271	149 J	298	194 J	167	435 J	323	321 J	--- / ---	--- / ---
Selenium	< 0.46	< 0.43	< 0.36	< 0.43	< 0.68	< 0.49	0.85	< 0.39	< 0.54	--- / ---	10,000 / 390
Silver	< 0.23 L	< 0.22	< 0.18 L	< 0.21	< 0.34 L	< 0.25	< 0.25	< 0.20	< 0.27 L	--- / 1	10,000/390
Sodium	< 28.4	27	< 22.1	34.2	< 42	< 68.3	164	< 54.4	< 33.3	--- / ---	--- / ---
Thallium	0.57	< 0.43	< 0.36	0.52	< 0.80	< 0.49	< 0.51	< 0.39	< 0.54	--- / ---	140 / 5.5
Vanadium	13.2	7.1	4.9	6.9	8.5	5	15.7	7.4	12.4	--- / ---	14,000 / 550
Zinc	12.3 B	11.6	15	9.5	39.7	5.3	49.3	8.7	56.2	--- / 150	610,000 / 23,000

Notes:

(1) EPA BTAG levels (flora/fauna) for sediment

(2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils

**bold dbl. underline** indicates concentration above risk screening criteria

**Laboratory/Validation Qualifiers:**

L - Reported value may be biased low.

B - Compound was detected in associated QC blank.

R - Rejected value due to severe deviations in CLP methods.

J - Estimated value.

**TABLE 4-13 (continued)**  
**SEDIMENT RESULTS - INORGANICS (mg/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-012		SD34-013	SD34-014	SD34-015	SD34-016	SD34-017	SD34-018		BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup> (Ind/Res)
	0 - 6 in	2 - 3 ft	0 - 6 in	0 - 6 in	0 - 6 in	0 - 6 in	0 - 6 in	0 - 6 in	2 - 3 ft		
Aluminum	7,770 J *	5840	2,610 J	2,200 J	3960	5560	2,230	3390	9700	--- / ---	2,000,000/78,000
Antimony	< 0.27 L	< 0.47	< 0.21 L	< 0.36 L	0.38 B	0.29 B	< 0.34 L	< 0.41	< 0.35	--- / 150	820 / 31
Arsenic	<b><u>6.2</u></b> *	<b><u>0.84</u></b>	<b><u>1.1</u></b>	<b><u>1.5</u></b>	<b><u>1.7</u></b>	<b><u>1.4</u></b>	< 1	<b><u>0.87</u></b> *	<b><u>0.63</u></b>	8.2 / 8.2	3.8 / 0.43
Barium	38.2	29.6	29.1	10.4	38.2	30.7	24.8	23.2 *	26.6	--- / ---	140,000 / 5,500
Beryllium	0.57 *	0.27	< 0.21	< 0.36	0.38	0.27	0.34	< 0.20	< 0.24	--- / ---	4,100 / 160
Cadmium	< 0.27	< 0.23	< 0.21	< 0.36	<0.28	<0.25	< 0.34	< 0.20	< 0.18	5.1 / 1.2	1,000 / 39
Calcium	1450 *	472	300 B	2,370	726 B	458 B	471 B	250 *	164	--- / ---	--- / ---
Chromium	<b><u>10.6 J</u></b> *	<b><u>6.2</u></b>	<b><u>2.7 J</u></b>	<b><u>2.6 J</u></b>	<b><u>3.8 B</u></b>	<b><u>6.9</u></b>	<b><u>3.2</u></b>	<b><u>3.5</u></b>	<b><u>11.2</u></b>	0.005 / 260	6,100 / 230
Cobalt	5.9 *	0.9	0.46	1.5	1.3	1.43	0.72	0.56 *	0.72	--- / ---	120,000 / 4,700
Copper	<b><u>61.3</u></b>	2.8	3.1	4	2.1	13.1	1.4 B	1.5 *	2.7	--- / 34	82,000 / 3,100
Cyanide	< 0.68	-	< 0.55	< 0.72	<6.9 R	<0.53 R	< 0.51	-	-	--- / ---	41,000/1,600
Iron	9,340 J *	3390	3,130 J	1,810 J	1790	2880	490	2200	2170	--- / ---	610,000 / 23,000
Lead	<b><u>79.7</u></b> *	7.3	16.4	23.9	<b><u>54.4</u></b>	16.9	8.4	13.1 *	6.6	--- / 46.7	400
Magnesium	1030 *	513	259	1,800	412	363	111	201 *	351	--- / ---	--- / ---
Manganese	374 *	11.7	4.2	253	10.9	18.3	7.1	5.6 J *	7.9	--- / ---	41,000 / 1,600
Mercury	< 0.14	< 0.05	< 0.11	< 0.15	<0.15 R	<0.10 R	< 0.16	<0.10	< 0.10	0.15 / 0.15	--- / ---
Nickel	7 *	2.9	1.5	2.8	2.8	3.4	2.5	1.4 *	3.4	20.9 / 20.9	41,000/1,600
Potassium	682 J *	509	235 J	597 J	293 B	292 B	129 B	175 *	544	--- / ---	--- / ---
Selenium	0.75	< 0.47	0.49	< 0.71	< 0.51	0.66 B	< 0.67 L	< 0.41	< 0.35	--- / ---	10,000 / 390
Silver	< 0.27	< 0.23	< 0.21 L	< 0.36 L	<0.25	<0.25	< 0.34 L	< 0.20	< 0.18	--- / 1	10,000/390
Sodium	500	272	465	2,390	381 B	30.5	< 41.4	104 *	47.4	--- / ---	--- / ---
Thallium	< 0.54	0.51	< 0.43	< 0.71	< 0.57	< 0.50	< 0.67	0.53	0.47	--- / ---	140 / 5.5
Vanadium	22.3 *	9.6	9.2	10.8	8.2	11.1	4.8	7.8	15.4	--- / ---	14,000 / 550
Zinc	90.3 *	11.9	6.4 B	10.7 B	9.5 B	21.6 B	8.6 B	5.3	8.3	--- / 150	610,000 / 23,000

Notes:

(1) EPA BTAG levels (flora/fauna) for sediment

(2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils

**bold dbl. underline** indicates concentration above risk screening criteria

\* - Results from duplicate sample

**Laboratory/Validation Qualifiers:**

L - Reported value may be biased low.

B - Compound was detected in associated QC blank.

R - Rejected value due to severe deviations in CLP methods.

J - Estimated value.

**TABLE 4-13 (continued)**  
**SEDIMENT RESULTS - INORGANICS (mg/kg)**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	SD34-019	SD34-020		SD34-021	SD34-022		SD34-023		BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup> (Ind/Res)
	0 - 6 in	0 - 6 in	2 - 3 ft	0 - 6 in	0 - 6 in	2 - 3 ft	0 - 6 in	2 - 3 ft		
Aluminum	8060	2880	9060	5410	2390 *	7470	1650	17000	--- / ---	2,000,000/78,000
Antimony	4.2	< 1	< 0.43	< 0.76	< 0.59	< 0.57	< 0.58	< 0.35	--- / 150	820 / 31
Arsenic	<b><u>7.2</u></b>	<b><u>1.5</u></b>	<b><u>0.92</u></b>	<b><u>3.8</u></b>	<b><u>2.9</u></b> *	<b><u>2.2</u></b>	<b><u>1.3</u></b>	<b><u>3.2</u></b>	8.2 / 8.2	3.8 / 0.43
Barium	42.1	22.9	23.9	14.4	8.8 *	31.9	9.9	60.8	--- / ---	140,000 / 5,500
Beryllium	0.82	< 0.51	0.23	< 0.38	0.35 *	0.33	< 0.29	0.27	--- / ---	4,100 / 160
Cadmium	< 0.58	< 0.51	< 0.22	< 0.38	< 0.30	< 0.28	< 0.29	< 0.17	5.1 / 1.2	1,000 / 39
Calcium	3220	2980	461	1090	1900	760	459	289	--- / ---	--- / ---
Chromium	<b><u>10.7</u></b>	<b><u>3.6</u></b>	<b><u>11.1</u></b>	<b><u>7.6</u></b>	<b><u>4.9</u></b> *	<b><u>4.6</u></b>	<b><u>3.4</u></b>	<b><u>13.2</u></b>	0.005 / 260	6,100 / 230
Cobalt	5.9	1.3	0.61	1.2	2.2 *	0.96	0.53	1.3	--- / ---	120,000 / 4,700
Copper	15	7.6	4.7	18.4	30.9 *	14.5	16.6	5.9	--- / 34	82,000 / 3,100
Cyanide	-	-	-	-	-	-	-	-	--- / ---	41,000/1,600
Iron	11,800	1,360	1,910	5,120	3950 *	2,800	2,510	12,300	--- / ---	610,000 / 23,000
Lead	<b><u>68.7</u></b>	43.5	9.3	28.3	44.1	15.3	35	10.8	--- / 46.7	400
Magnesium	2070	1870	575	1090	1380	550	244	954	--- / ---	--- / ---
Manganese	249	51.3	4.4	32.6	222	15.2	16.5	17.4	--- / ---	41,000 / 1,600
Mercury	< 0.31	< 0.25	< 0.07	< 0.18	< 0.17	< 0.12	< 0.13	< 0.08	0.15 / 0.15	--- / ---
Nickel	7.1	3.8	3.9	3.6	2.8 *	1.9	1.1	4.9	20.9 / 20.9	41,000/1,600
Potassium	1160	678	449	650	345	916	158	952	--- / ---	--- / ---
Selenium	2.2	< 1	< 0.43	< 0.76	0.61	1.1	< 0.58	0.57	--- / ---	10,000 / 390
Silver	< 0.58	< 0.51	< 0.22	< 0.38	< 0.30	< 0.28	< 0.29	< 0.17	--- / 1	10,000/390
Sodium	4140	2810	578	1900	1700	605	368	363	--- / ---	--- / ---
Thallium	< 1.2	1.2	< 0.43	0.86	0.71 *	1.3	< 0.58	0.75	--- / ---	140 / 5.5
Vanadium	27.2	12.9	11.1	20	10.2 *	12.4	7.5	32.3	--- / ---	14,000 / 550
Zinc	50.5	25.9	8.3	18.5	37.8	32.1	14.1	17.7	--- / 150	610,000 / 23,000

Notes:

(1) EPA BTAG levels (flora/fauna) for sediment

(2) EPA Region III Risk-based Concentration Criteria for Industrial/Residential Soils

**bold dbl. underline** indicates concentration above risk screening criteria

\* - Results from duplicate sample

**Laboratory/Validation Qualifiers:**

L - Reported value may be biased low.

B - Compound was detected in associated QC blank.

R - Rejected value due to severe deviations in CLP methods.

J - Estimated value.

**TABLE 4-14  
SURFACE WATER RESULTS  
DOL STORAGE YARD SITE, BLDG 1607**

Parameters	Sample ID and Results					BTAG <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
	SW34-001	SW34-002	SW34-003	SW34-004	SW34-005		
<b>VOCs (ug/l)</b>							
<b>TIC's</b>							
Chlorodifluoromethane	9 NJ	ND	ND	14 NJ	ND	- / -	100,000
<b>SOCs (ug/l)</b>							
bis(2-Ethylhexyl)phthalate	< 10	3 J *	< 10	< 10	< 10	- / 30	4.8
2,4-Dimethylphenol	< 10	7 J	< 10	< 10	< 10	- / 2,120	730
4-Methylphenol	< 10	9 J	< 10	< 10	< 10	- / -	180
<b>TIC's</b>							
Aldehydes (Unknown type)	35 J	2 J	2 J	ND	ND	- / -	-
Cyclohexanecarboxylic Acid	ND	6 NJ	ND	ND	ND	- / -	-
Sulfur (Mol. S8)	ND	3 NJ	ND	ND	ND	- / -	-
<b>Pest/PCBs (ug/l)</b>							
DDD	< 0.10	<b><u>11 D</u></b>	< 0.10	< 0.10	< 0.10	- / 0.60	0.28
DDE	< 0.10	<b><u>1.1</u></b>	< 0.10	< 0.10	< 0.10	- / 1,050	0.20
DDT	< 0.10	<b><u>46 CD</u></b>	<b><u>0.14</u></b>	< 0.10	< 0.10	5,000/0.001	0.20
<b>Total Metals (ug/l)</b>							
Aluminum	<b><u>628</u></b>	<b><u>1,260 *</u></b>	<b><u>213 K</u></b>	<b><u>216 K</u></b>	<b><u>648</u></b>	460 / 200	37,000
Antimony	< 1	< 1	< 1	< 1	< 1	- / 30	15
Arsenic	< 3	< 3	< 3	< 3	< 3	- / 874	0.045
Barium	37 J	53.9 J *	32.8 J	19.8 J	60.2 J	- / 10,000	2,600
Beryllium	< 1	< 1	< 1	< 1	1.1	100,000/5.3	73
Cadmium	< 1	< 1	< 1	< 1	< 1	1.1 / 0.15	18
Calcium	5,620 J	39,700 J *	15,600 J	11,800 J	11,700 J	- / -	-
Chromium (as Cr VI)	< 1	<b><u>1.1 *</u></b>	< 1	< 1	< 1	2 / 1	110
Cobalt	2.3	24.7 *	1.6	< 1	7.7	- / -	2,200
Copper	4.6	3.2 *	6.2	<b><u>21.4</u></b>	4	- / 6.5	1,500
Cyanide	< 10	< 10	< 10	< 10	< 10	- / 5.2	730
Iron	<b><u>584 J</u></b>	<b><u>12,700 J *</u></b>	274 J	214 J	<b><u>1,290 J</u></b>	- / 320	11,000
Lead	<b><u>11.6</u></b>	<b><u>8.1 *</u></b>	< 2	<b><u>3.8</u></b>	<b><u>4</u></b>	- / 1	15 <sup>(3)</sup>
Magnesium	1,220	12,000 *	2,650	1,430	4,120	- / -	-
Manganese	55.9 J	483 J *	65 J	14.3 J	191 J	- / -	730
Mercury	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	- / 0.012	-
Nickel	2.7	<b><u>19 *</u></b>	3.1	2.9	13.5	- / 14.77	730
Potassium	685	1770 *	1,080	1,250	1,360	- / -	-
Selenium	< 2	< 2	< 2	< 2	< 2	522 / 3	180
Silver	< 1 L	< 1 L	< 1 L	< 1 L	< 1 L	1.9/0.0001	180
Sodium	3,940	10,300 *	7,060	5,060	10,900	- / -	-
Thallium	2.1	< 2	< 2	< 2	< 2	- / 40	2.6
Vanadium	2.6	3.9 *	< 1	1.6	2.4	- / 10,000	260
Zinc	<b><u>135</u></b>	89.7 *	107	<b><u>128</u></b>	95.1	110 / 110	11,000

Notes:

- (1) EPA BTAG levels (flora/fauna) for surface water
- (2) EPA Region III RBC for tap water
- (3) USEPA Action Level for Drinking Water
- bold dbl. underline** indicates concentration above risk screening criteria
- ND - Not detected
- \* - Result from duplicate sample

**Laboratory/Validation Qualifiers:**

- J - Estimated concentration
- C - Detection confirmed by GC/MS.
- D - Concentration from secondary dilution.
- K - Reported value may be biased high.
- L - Reported value may be biased low.

**TABLE 4-15  
DPT GROUNDWATER RESULTS  
DOL STORAGE YARD SITE, BLDG 1607**

Parameters	Sample ID and Results					USEPA MCLs <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
	GW34-001	GW34-003	GW34-004	GW34-005	GW34-006		
<b>VOCs (ug/l)</b>							
Chloroform	< 10	< 10	< 10	< 10	<u>2 J</u>	100	0.15
Tetrachloroethene	<u>2 J</u>	< 10	< 10	< 10	<u>3 J</u>	5	1.1
<b>TIC's</b>							
Chlorodifluoromethane	320 NJ	19 NJ	ND	46 NJ	ND	-	87,000
<b>SOCs (ug/l)</b>							
bis(2-EH)phthalate	<u>670 J</u>	4 B	<u>8 B *</u>	<u>6 B</u>	4 B	6	4.8
<b>TIC's</b>							
Acetophenone	ND	<u>3 NJ</u>	ND	<u>2 NJ</u>	<u>6 NJ</u>	-	0.042
alpha-Methylstyrene	ND	ND	ND	ND	ND	-	-
Bromacil	ND	3 NJ	3 NJ	3 NJ	37 NJ	-	-
Decanoic Acid	ND	5 NJ	ND	ND	5 NJ	-	-
1-Hexanol, 2-ethyl-	ND	ND	ND	ND	3 NJ	-	-
4,4'-(1-me)phenol	98 NJ	22 NJ	ND	21 NJ	43 NJ	-	-
Nonanoic Acid	ND	ND	ND	ND	ND	-	-
Octanoic Acid	ND	5 NJ	ND	ND	5 NJ	-	-
Oleic Acid	ND	2 NJ	ND	ND	ND	-	-
Sulfur (Mol. S8)	ND	ND	ND	ND	ND	-	-
<b>Pest/PCBs (ug/l)</b>							
Heptachlor epoxide	< 0.05	< 0.05	< 0.05	< 0.05	<u>0.15 JN</u>	0.2	0.0012
gamma-BHC (Lindane)	< 0.05	<u>0.27</u>	< 0.05	<u>0.17</u>	< 0.05	0.2	0.052
<b>Total/Dissolved Metals (ug/l)</b>							
Aluminum	69.6 B 64.1 B	6,180 B 31.8 B	370 B 29.1 B	721 B 18.5 B	1,560 B < 15	-	37,000
Antimony	1.2 B < 1	< 1 < 1	< 1 < 1	< 1 < 1	< 1 < 1	6	15
Arsenic	< 3 < 3	<u>8.9</u> < 3	< 3 < 3	< 3 < 3	< 3 < 3	50	0.045
Barium	84.3 79	84.5 56.1	68.0 74.9	35.6 45.4 B	49.6 B 63.8	2,000	2,600
Beryllium	< 1 < 1	<u>2.1</u> < 1	<u>1.4</u> < 1	< 1 < 1	< 1 < 1	4	0.016
Cadmium	< 1 < 1	< 1 < 1	< 1 < 1	< 1 < 1	< 1 < 1	5	18
Calcium	8460 8050	5,850 5,540	7770 * 7,610	5,950 5,090	3,200 3,080	-	-
Chromium	1.2 B 1.1 B	47.3 B < 1	1.6 B < 1	1.8 B < 1	4.1 B < 1	100	37,000
Cobalt	2.4 B 2.1 B	11.7 4.4 B	13.2 3 B	1.5 B 1 B	3.8 B 2.7 B	-	2,200
Copper	< 1 < 1	13.3 2.2 B	1.2 B < 1	2.5 B 2.4 B	4 B < 1	1,300(s)	1,500
Cyanide	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	200	730
Iron	691 B 564 B	<u>24600</u> 45.7 B	1,190 B 18.4 B	1,430 B 77.6 B	5,250 L 26.9 B	-	11,000
Lead	2.3 B < 2	7.1 B < 2	< 2 < 2	< 2 < 2	< 2 < 2	15 <sup>(3)</sup>	-
Magnesium	3180 2960	3,010 2,590	3720 * 3,740	1,600 1,520	1,880 1,790	-	-
Manganese	<u>78.6</u> <u>67.7</u>	<u>337</u> <u>113</u>	<u>166</u> 40.9 B	<u>67</u> 39.3 B	<u>81.4</u> 47.8 B	50(s)	180
Mercury	< 0.20 < 0.20	< 0.20 < 0.20	< 0.20 < 0.20	< 0.20 < 0.20	< 0.20 < 0.20	2	11
Nickel	26.8 B 24.9 B	29.1 B 11.3 B	13 11.3 B*	7.1 B 6.3 B	7 B 5 B	-	730
Potassium	2,460 2,560	2,700 1,930 B	1,990 B* 2,270 B	1,140 B 1,140 B	1,430 B 1,240 B	-	-
Selenium	< 2 < 2	< 2 < 2	2.3 B < 2	< 2 < 2	< 2 < 2	50	180
Silver	< 1 L < 1 L	< 1 L < 1 L	< 1 L < 1 L	< 1 L < 1 L	6.1 L < 1 L	-	180
Sodium	20,900 19,600	6,820 6,880	9040 * 9,010	7,070 6,920	10,500 10,700	-	-
Thallium	< 2 < 2	< 2 < 2	<u>3.6 B</u> < 2	< 2 < 2	< 2 < 2	2	-
Vanadium	< 1 < 1	21 < 1	1.8 B < 1	2.2 B < 1	5.8 B < 1	-	260
Zinc	23.4 B 29 B	219 B 106 B	44 B 44.6 B*	95.2 B 70.8 B	69.4 B 50.1 B	5,000(s)	11,000

Notes:

- (1) EPA MCLs (s - secondary MCL)
- (1) EPA Region III RBC for tap water
- (2) USEPA Action Level for Drinking Water
- \* - Result from duplicate sample
- bold dbl. underline** indicates concentration above risk screening criteria

**Laboratory/Validation Qualifiers:**

- J - Estimated concentration
- L - Reported value may be biased low.
- B - Compound was detected in the associated QC blank.
- N - Presumptive evidence of the compound based on MS library search
- ND - Not detected

**TABLE 4-15 (continued)**  
**DPT GROUNDWATER RESULTS**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	Sample ID and Results				USEPA MCLs <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
	GW34-007	GW34-008	GW34-009	GW34-010		
<b>VOCs (ug/l)</b>						
Chloroform	< 10	< 10	< 10	< 10	100	0.15
Tetrachloroethene	< 10	< 10	< 10	< 10	5	1.1
<b>TIC's</b>						
Chlorodifluoromethane	ND	78 NJ	ND	ND	-	87,000
<b>SOCs (ug/l)</b>						
bis(2-EH)phthalate	3 J	3 J	<u>6 B</u>	<u>59</u>	6	4.8
<b>TIC's</b>						
Acetophenone	<u>4 NJ</u>	<u>7 NJ</u>	<u>4 NJ</u>	<u>5 NJ</u>	-	0.042
alpha-Methylstyrene	4 NJ	11 NJ	ND	ND	-	-
Bromacil	ND	ND	ND	ND	-	-
Decanoic Acid	ND	ND	6 NJ	ND	-	-
1-Hexanol, 2-ethyl-	ND	ND	4 NJ	7 NJ	-	-
4,4'-(1-me)phenol	8 NJ	14 NJ	30 NJ	40 NJ	-	-
Nonanoic Acid	ND	2 NJ	3 NJ	ND	-	-
Octanoic Acid	ND	4 NJ	5 NJ	ND	-	-
Oleic Acid	ND	ND	ND	ND	-	-
Sulfur (Mol. S8)	ND	ND	4 NJ	ND	-	-
<b>Pest/PCBs (ug/l)</b>						
Heptachlor epoxide	< 0.05	< 0.05	< 0.05	< 0.05	0.2	0.0012
gamma-BHC (Lindane)	<u>0.23</u>	<u>1.1 K</u>	< 0.05	< 0.05	0.2	0.052
<b>Total/Dissolved Metals (ug/l)</b>						
Aluminum	2210 81.3 B	1220 265	579 B < 15	381 B < 15	-	37,000
Antimony	< 1 < 1	< 1 < 1	1.6 < 1	< 1 < 1	6	15
Arsenic	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	50	0.045
Barium	66.3 51.4 B	44.1 B 42.2 B	51.9 48.2	56.1 58.6	2,000	2,600
Beryllium	<u>1.3 B</u> < 1	< 1 < 1	< 1 < 1	< 1 < 1	4	0.016
Cadmium	< 1 < 1	< 1 < 1	< 1 < 1	< 1 < 1	5	18
Calcium	7330 7340	6480 6130	13,800 14,100	24,900 27,800	-	-
Chromium	7.4 B < 1	3.2 B 1.3 B	2.6 B < 1	2.3 B < 1	100	37,000
Cobalt	5.6 B < 1	1.6 B < 1	1.9 < 1	< 1 < 1	-	2,200
Copper	2.7 B < 1	1.1 B < 1	2.8 < 1	1.6 < 1	1,300(s)	1,500
Cyanide	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	200	730
Iron	9,340 L 15.2 B	1,960 B 318 B	5,240 L 4,390 L	7,920 L 8,020 L	-	11,000
Lead	3.5 B < 2	< 2 < 2	< 2 < 2	< 2 < 2	15 <sup>(3)</sup>	-
Magnesium	4810 4800	3330 3250	2390 2420	2,840 3,150	-	-
Manganese	<u>290</u> 47.6 B	<u>67</u> 27.8 B	<u>75.9</u> <u>70.6</u>	<u>133</u> <u>171</u>	50(s)	180
Mercury	< 0.20 < 0.20	< 0.20 < 0.20	< 0.20 < 0.20	< 0.20 < 0.20	2	11
Nickel	15.5 B 10.6 B	8.2 B 7.1 B	2 B < 1	2.5 B 2.8 B	-	730
Potassium	2,280 2,090 B	1,890 B 2,280	1,120 1,560	1,400 1,600	-	-
Selenium	< 2 < 2	2.1 2.1	< 2 < 2	< 2 < 2	50	180
Silver	< 1 L < 1 L	< 1 L < 1 L	< 1 L < 1 L	< 1 L < 1 L	-	180
Sodium	7,590 7,650	7,070 7,030	8,030 8,270	10,800 11,900	-	-
Thallium	< 2 < 2	< 2 < 2	<u>3.8</u> < 2	< 2 < 2	2	-
Vanadium	11 B < 1	3.2 B < 1	2.7 < 1	1.5 < 1	-	260
Zinc	74 B 150 B	38.7 B 29.6 B	15.3 B 9.3 B	15.6 B 26.5 B	5,000(s)	11,000

Notes:

- (1) EPA MCLs (s - secondary MCL)
- (1) EPA Region III Risk-based Concentration Criteria for Tap Water
- (2) USEPA Action Level for Drinking Water
- bold dbl. underline** indicates concentration above risk screening criteria

**Laboratory/Validation Qualifiers:**

- J - Estimated concentration
- L - Reported value may be biased low.
- B - Compound was detected in the associated QC blank.
- K - Reported value may be biased high.
- ND - Not detected

**TABLE 4-16  
MONITORING WELL RESULTS  
DOL STORAGE YARD SITE, BLDG 1607**

Parameters	Sample ID and Results					USEPA MCLs <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
	MW-1	MW-2	MW-3	MW-4	MW-5		
<b>VOCs (ug/l)</b>							
Chloroform	< 10	< 10	< 10	<b>6 J</b>	<b>2 J</b>	100	0.15
Tetrachloroethene	< 10	< 10	< 10	< 10	<b>2 J</b>	5	1.1
<b>TIC's</b>							
Chlorodifluoromethane	ND	ND	ND	ND	86 JN	-	87,000
Difluoromethane	ND	ND	ND	ND	ND	-	-
2-methoxy-2-methylpropane	ND	ND	ND	ND	ND	-	-
1,1,2-Trichloro-1,2-ethane	ND	ND	ND	ND	8 JN	-	-
<b>SOCs (ug/l)</b>							
bis(2-Ethylhexyl)phthalate	<b>5 J</b>	4 J	< 10	3 J	2 J	6	4.8
<b>TIC's</b>							
Bromacil	ND	29 NJ	ND	ND	8 NJ	-	-
4,4'-butylidenebis(...)phenol	ND	ND	2 NJ	ND	ND	-	-
1,2-Cyclohexanediol isomer	2 XJ	3 XJ	ND	ND	ND	-	-
Cyclohexanol	34 XNJB	37 XNJB	60 XNJB	96 XNJB	35 XNJB	-	-
2-Cyclohexen-1-one	ND	ND	ND	ND	2 XNJ	-	-
Diethyltoluamide	3 NJ	ND	ND	ND	ND	-	-
2,2'-oxybisethanol	ND	ND	ND	4 NJ	ND	-	-
Sulfur, mol. (88)	ND	2 NJ	ND	ND	ND	-	-
<b>Pest/PCBs (ug/l)</b>							
gamma-BHC (Lindane)	< 0.05	< 0.05	-	< 0.05	< 0.05	0.2	0.052
<b>Total/Dissolved Metals (ug/l)</b>							
Aluminum	2,180	26.8 B	41,300	39.3 B	-	-	37,000
Antimony	1.8 B	< 1	< 1	1.1 B	-	-	15
Arsenic	<b>3.7 B</b>	< 2	<b>16.1</b>	< 2	-	-	0.045
Barium	74.5 B	63.1 B	236	70.1 B	-	-	2,600
Beryllium	<b>1.4 B</b>	< 1	<b>3.2 B</b>	< 1	-	-	0.016
Cadmium	< 1	< 1	< 1	< 1	-	-	18
Calcium	132,000	140,000	20,200	17,300	-	-	-
Chromium	5.4 B	< 1	72.9	< 1	-	-	37,000
Cobalt	20.1 B	20.5 B	21.7 B	2.6 B	-	-	2,200
Copper	7.2 B	1.7 B	50.8	< 1	-	-	1,500
Cyanide	< 10	< 10	< 10	< 10	-	-	730
Iron	4,220	1,010	<b>56,800</b>	30.9 B	-	-	11,000
Lead	2.4 B	< 1	<b>43.1</b>	< 1	-	-	-
Magnesium	11,600	12,400	5,140	1,590	-	-	-
Manganese	<b>1,130</b>	<b>1,230</b>	<b>337</b>	<b>61.9</b>	-	-	180
Mercury	< 0.20	< 0.20	0.26	< 0.20	-	-	11
Nickel	26.7 B	26 B	28.6 B	2.7 B	-	-	730
Potassium	4,680 B	4670 B	8,190	3,920 B	-	-	-
Selenium	< 2	< 2	8.6	2.4 B	-	-	180
Silver	< 1	< 1	< 1	< 1	-	-	180
Sodium	20,300	23,100	9,910	11,300	-	-	100,000 <sup>(3)</sup>
Thallium	3.0 B	< 2	< 2	< 2	-	-	-
Vanadium	8.8 B	3.9 B	87.2	< 1	-	-	260
Zinc	130	442	202	686	-	-	11,000

Notes:

(1) EPA MCLs

(2) EPA Region III Risk-based Concentration Criteria for Tap Water unless otherwise noted

(3) USEPA Action Level for Drinking Water

**bold dbl. underline** indicates concentration above risk screening criteria

**Laboratory/Validation Qualifiers:**

B - Compound was detected in the associated QC blank.

J - Estimated concentration

N - Presumptive evidence of the compound based on the mass spectral library search

X - Designates a non-target which can be attributed to lab contamination

ND - Not detected

**TABLE 4-16 (continued)**  
**MONITORING WELL RESULTS**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	Sample ID and Results					USEPA MCLs <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
	MW-6	MW-7S	MW-7D	MW-8	MW-9		
<b>VOCs (ug/l)</b>							
Chloroform	< 10	-	< 10	-	-	100	0.15
Tetrachloroethene	< 10	-	< 10	-	-	5	1.1
<b>TIC's</b>							
Difluoromethane	ND	-	22 NJ	-	-	-	-
2-methoxy-2-methylpropane	8 JN	-	ND	-	-	-	-
<b>SOCs (ug/l)</b>							
bis(2-Ethylhexyl)phthalate	< 10	2 J	2 J	< 10	< 10	6	4.8
<b>TIC's</b>							
Bromacil	2 NJ	ND	ND	ND	ND	-	-
4,4'-butylidenebis(...)phenol	2 NJ	ND	ND	ND	ND	-	-
1,2-Cyclohexanediol isomer	2 XBJ	ND	ND	ND	ND	-	-
cis-2-Cyclohexanediol isomer	ND	ND	2 XBJ	ND	ND	-	-
Cyclohexanol	16 XNJB	100 XNJB	58 XNJB	ND	ND	-	-
2-Cyclohexen-1-one	ND	ND	2 XNJ	ND	2 XNJ	-	-
Diethyltoluamide	4 NJ	2 NJ	ND	ND	3 NJ	-	-
4,4-Dipropylheptane	ND	ND	ND	3 NJ	ND	-	-
1-methyl-2-pyrrolidinone	ND	ND	ND	3 NJ	ND	-	-
2-methylcyclopenten-1-one	4 BNJ	ND	ND	ND	ND	-	-
Sulfur, mol. (88)	ND	ND	2 NJ	ND	ND	-	-
<b>Pest/PCBs (ug/l)</b>							
gamma-BHC (Lindane)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.20	0.052
<b>Total/Dissolved Metals (ug/l)</b>							
Aluminum	<u>114,000</u> < 16	<u>98,000</u> 725	50,300 < 16	21,700 < 16	8,450 < 16	-	37,000
Antimony	< 1 < 1	1.7 B < 1	< 1 < 1	1.3 B < 1	1.2 B < 1	6	15
Arsenic	<u>67.5</u> < 2	<u>70.5</u> < 2	<u>22.6</u> < 2	<u>12.2</u> < 1	<u>8.9 B</u> < 2	50	0.045
Barium	519 14.1 B	643 25.6 B	408 94.8 B	277 89.1 B	85.2 B 43.4 B	2000	2,600
Beryllium	<u>7.7</u> < 1	<u>10.5</u> < 1	<u>4.7 B</u> < 1	<u>3.5 B</u> < 1	<u>1.3 B</u> < 1	4	0.016
Cadmium	< 1 < 1	< 1 < 1	< 1 < 1	< 1 < 1	< 1 < 1	2	18
Calcium	17,200 9,220	10,800 5,680	82,400 75,400	22,600 20,500	26,600 25,600	-	-
Chromium	127 < 1	128 < 1	99.2 < 1	42 < 1	25.2 < 1	100	37,000
Cobalt	109 10.3 B	145 5.9 B	36.8 B 1.8 B	79.4 23.3 B	7.2 B < 1	-	2,200
Copper	95.4 < 1	88.8 < 1	67.2 1.3 B	35 1.3 B	14.2 B < 1	1300	1,500
Cyanide	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	200	730
Iron	<u>147,000</u> 31.1 B	<u>191,000</u> 684	<u>109,000</u> 66.7 B	<u>19,300</u> 893	<u>12,900</u> 1,480	-	11,000
Lead	<u>98</u> < 1	<u>110</u> < 1	<u>57.4</u> < 1	<u>30.3</u> < 1	<u>19</u> < 1	15 <sup>(3)</sup>	-
Magnesium	14,000 2,890 B	15,900 4,800 B	12,900 3,800 B	6,800 4,160 B	5,160 3,650	-	-
Manganese	<u>1,760</u> <u>202</u>	<u>5,700</u> <u>211</u>	<u>1,510</u> <u>394</u>	<u>2,070</u> <u>1,770</u>	<u>161</u> <u>123</u>	50	180
Mercury	0.3 < 0.20	0.34 < 0.20	< 0.20 < 0.20	< 0.20 < 0.20	< 0.20 < 0.20	2	11
Nickel	94.4 4.5 B	99.8 6.1 B	62.1 2.6 B	81.2 4.7 B	15.1 B < 1	-	730
Potassium	11,500 1,460 B	11,500 2,100 B	11,500 2,480 B	4,260 B 1,280 B	3,350 B 1,290 B	-	-
Selenium	12.2 < 2	15.1 < 2	9.6 < 2	3.2 B < 2	2.6 B < 2	50	180
Silver	< 1 < 1	< 1 < 1	< 1 < 1	< 1 < 1	< 1 < 1	-	180
Sodium	4,400 B 4,180 B	8,670 7,400	26,100 28,500	11,700 12,300	9,500 9,460	-	100,000 <sup>(3)</sup>
Thallium	< 2 < 2	< 2 < 2	< 2 < 2	< 2 < 2	< 2 < 2	2	-
Vanadium	242 < 1	257 1.5 B	129 < 1	68.1 1.4 B	29.7 B < 1	-	260
Zinc	597 63.3	575 77.1	353 27.7	309 44.3	122 23.1	5000	11,000

Notes:

- (1) EPA MCLs
- (2) EPA Region III Risk-based Concentration Criteria for Tap Water unless otherwise noted
- (3) USEPA Action Level for Drinking Water **bold dbl. underline** indicates concentration above risk screening criteria

**Laboratory/Validation Qualifiers:**

- B - Compound was detected in the associated QC blank.
- J - Estimated concentration
- N - Presumptive evidence of the compound based on the mass spectral library search
- X - Designates a non-target which can be attributed to lab contamination
- ND - Not detected

**TABLE 4-16 (continued)**  
**MONITORING WELL RESULTS**  
**DOL STORAGE YARD SITE, BLDG 1607**

Parameters	Sample ID and Results						USEPA MCLs <sup>(1)</sup>	EPA RBC <sup>(2)</sup>
	MW-10S		MW-10D		MW-11			
<b>VOCs (ug/l)</b>								
Chloroform	-		< 10		-		100	0.15
Tetrachloroethene	-		< 10		-		5	1.1
<b>SOCs (ug/l)</b>								
bis(2-Ethylhexyl)phthalate	3 J		4 J *		< 10		6	4.8
<b>TIC's</b>								
4,4'-butylidenebis(...)phenol	ND		6 NJ		ND		-	-
1,2-Cyclohexanediol isomer	7 BXJ		5 XBJ		ND		-	-
Cyclohexanol	ND		4 XNJ		ND		-	-
Diethyltoluamide	ND		3 NJ		ND		-	-
<b>Pest/PCBs (ug/l)</b>								
gamma-BHC (Lindane)	< 0.05		< 0.05		<b>0.94 D</b>		0.2	0.052
<b>Total/Dissolved Metals (ug/l)</b>								
Aluminum	9,040	16.4	2980 *	< 16	2,420	< 16	-	37,000
Antimony	< 1	< 1	< 1	< 1	< 1	< 1	6	15
Arsenic	<b>4.3 B</b>	< 2	<b>3.6 B *</b>	< 2	<b>2.1 B</b>	< 2	50	0.045
Barium	109 B	62.4 B	46.5 B	67.3 B	64.1 B	73.1 B	2000	2,600
Beryllium	<b>1.5 B</b>	< 1	< 1	< 1	< 1	< 1	4	0.016
Cadmium	< 1	< 1	< 1	< 1	< 1	< 1	2	18
Calcium	13,300	12,700	60,900	63700 *	8,840	9,710	-	-
Chromium	17.5	< 1	10.9 *	< 1	5.2 B	< 1	100	37,000
Cobalt	8.4 B	1.9 B	3.3 B *	< 1	3.4 B	2.4 B	-	2,200
Copper	15.5 B	< 1	7.0 B *	1.1 B	6.7 B	< 1	1300	1,500
Cyanide	< 10	< 10	< 10	< 10	< 10	< 10	200	730
Iron	<b>15,100</b>	2,230	8420 *	198 *	3,190	22.4 B	-	11,000
Lead	10.1	< 1	5.5 *	< 1	3.7	1.2 B	15 <sup>(3)</sup>	-
Magnesium	3,540 B	2,360 B	5,270	4,970 B*	4,000 B	3,870 B	-	-
Manganese	<b>140</b>	<b>94.9</b>	<b>168</b>	<b>155 *</b>	40.1	21.6	50	180
Mercury	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	2	11
Nickel	13.2 B	2.5 B	6.6 B *	< 1	15.6 B	13.2 B	-	730
Potassium	2,900 B	1,200 B	4,520 B	4,100 B	2,370 B	2,020 B	-	-
Selenium	2.6 B	< 2	< 2	< 2	< 2	2.3 B	50	180
Silver	< 1	< 1	< 1	< 1	< 1	< 1	-	180
Sodium	7,610	7,280	13,500	14800 *	7,910	8,960	-	100,000 <sup>(3)</sup>
Thallium	< 2	< 2	< 2	< 2	< 2	< 2	2	-
Vanadium	23.5 B	< 1	9.3 B *	< 1	6.4 B	< 1	-	260
Zinc	77.7	43.6	54.8 *	18.9 *	62.1	916	5000	11,000

Notes:

- (1) EPA MCLs
  - (2) EPA Region III Risk-based Concentration Criteria for Tap Water unless otherwise noted
  - (3) USEPA Action Level for Drinking Water
- bold dbl underline** indicates concentration above risk screening criteria  
\* - Result from duplicate sample  
ND - Not detected

**Laboratory/Validation Qualifiers:**

- B - Compound was detected in the associated QC blank.
- D - Diluted sample
- E - Excessive concentration
- J - Estimated concentration
- N - Presumptive evidence of the compound based on the mass spectral library search
- X - Designates a non-target which can be attributed to lab contamination

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**APPENDIX B – DOL STORAGE YARD ANALYTICAL DATA**

**MALCOLM PIRNIE 2004/2005/2007 LTM DATA**

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**FIVE-YEAR REVIEW REPORT  
FORT EUSTIS, VIRGINIA**

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**TABLE 15  
SOIL AND SEDIMENT - PESTICIDE COC RESULTS  
2004 LTM PROGRAM - DOL STORAGE YARD SITE**

Compound	Results (ug/kg)											PAL
	SW1-1	SW1-2	SW1-2 (dup)	SW2-1	SW2-2	SW3-1	SW3-2	SW4-1	SW5-1	FWET-1	FWET-2	
DDD	12	2.3 P	1.1 J	1.9 U	1.9 U	2 U	0.87 J	0.52 J	23	1.5 J	3	<b>100</b>
DDE	13	4.1	3	0.91 JP	0.59 J	0.47 J	1.8	1.1 J	3.8	1 J	2.3	<b>100</b>
DDT	<b>150 D</b>	3.4 P	2.3 JP	2.9 U	2.9 U	1.9 J	1.5 J	3.4 U	2.3 J	1.7 J	6.9	<b>100</b>
<b>Total DDD/DDE/DDT</b>	<b>175</b>	9.8	6.4	0.9	0.6	2.4	4.2	1.6	29.1	4.2	12.2	<b>100</b>

Notes: **550** Indicates detect above PAL

**Data Qualifiers:**

- U Not detected
- J Analyte present. Reported value between MDL and PQL
- D Secondary Dillution
- P Greater than 25% difference in 2 GC column results

**PAL** Project Action Limit from Final ROD

**TABLE 16**  
**SOIL AND SEDIMENT - PAH COC RESULTS**  
**2004 LTM PROGRAM - DOL STORAGE YARD SITE**

Compound	Results (ug/kg)											PAL
	SW1-1	SW1-2	SW2-1	SW2-1 (dup)	SW2-2	SW3-1	SW3-2	SW4-1	SW5-1	FWET-1	FWET-2	
Benzo(a)anthracene	380 U	380 U	380 U	380 U	380 U	390 U	48 J	450 U	430 U	450 U	450 U	<b>750</b>
Benzo(a)pyrene	380 U	380 U	380 U	380 U	380 U	390 U	41 J	450 U	430 U	450 U	450 U	<b>70</b>
Benzo(b)fluoranthene	380 U	380 U	380 U	380 U	380 U	390 U	44 J	450 U	430 U	450 U	450 U	<b>750</b>
Benzo(k)fluoranthene	380 U	380 U	380 U	380 U	380 U	390 U	51 J	450 U	430 U	450 U	450 U	<b>7,460</b>
Dibenzo(a,h)anthracene	380 U	380 U	380 U	380 U	380 U	390 U	390 U	450 U	430 U	450 U	450 U	<b>70</b>
Indeno(1,2,3-cd)pyrene	380 U	380 U	380 U	380 U	380 U	390 U	40 J	450 U	430 U	450 U	450 U	<b>750</b>

**Notes:** **550** Indicates detect above PAL

**Data Qualifiers:**

U Not detected

J Analyte present. Reported value between MDL and PQL

**PAL** Project Action Limit from Final ROD

**TABLE 17  
GROUNDWATER - METAL COC RESULTS  
2004 LTM PROGRAM - DOL STORAGE YARD SITE**

Metals	Monitoring Well I.D. and Sample Results in ug/l										Background Concentrations <sup>(1)</sup>		PALs <sup>(2)</sup>
	MW-5			MW-9		MW-10S		MW-11			Total	Dissolved	
	Total	Total (dup)	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Dissolved (dup)			
Aluminum	307	326	6 B	355	8 B	172 B	9 B	346	8 B	11 B	7,628	100	3,700
Antimony	<b>2.6 B</b>	2 U	<b>3.5 B</b>	<b>2.6 B</b>	<b>4.5 B</b>	<b>4.6 B</b>	2 U	<b>3.5 B</b>	<b>6.3 B</b>	2 U	250	25	1.5
Arsenic	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	17	5	0.045
Barium	42 B	41.6 B	40.4 B	33.6 B	27.3 B	46.9 B	45.9 B	46.9 B	43.8 B	43.4 B	243	112	260
Beryllium	0.24 B	0.23 B	0.12 B	0.17 B	0.1 U	0.12 B	0.1 U	0.2 B	0.14 B	0.15 B	6	2.5	4
Cadmium	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 B	0.33 B	6	9	1.8
Calcium	2,220 B	2,210 B	2,230 B	20,400	20,600	17,200	18,100	7,280	7,550	7,380	14,000	15,000	--
Chromium	1.8 B	1.6 B	0.5 U	2 B	0.5 U	1.5 B	0.5 U	2.1 B	1 B	1 B	37	5	11
Cobalt	2.5 B	2.3 B	2.7 B	1 B	0.4 B	1.4 B	1.4 B	0.39 B	0.73 B	0.85 B	12	10	73
Copper	1.5 B	1.4 B	1.8 B	1.1 B	6	2.4 B	1.2 B	0.98 B	1.5 B	1.1 B	52	12.5	150
Iron	578 E	591 E	11 U	<b>2,770 E</b>	<b>2,320</b>	<b>5,620 E</b>	<b>3,990</b>	469 E	11 U	11 U	14,979	5,192	1,100
Lead	2 B	1.2 B	0.9 U	1.1 B	0.9 U	0.93 B	0.9 U	0.9 U	0.9 U	0.9 U	55	6	15
Magnesium	1,960 B	1,940 B	1,970 B	3,670 B	3,800 B	2,880 B	3,070 B	3,760 B	3,890 B	3,860 B	16,474	17,325	--
Manganese	31.7 E	31.8 E	30.2	<b>252 E</b>	<b>256</b>	<b>91.9 E</b>	<b>94.7</b>	11.6 E	9.8 B	9.8 B	383	383.1	73
Mercury	0.1 UN	0.1 UN	0.1 U	0.1 UN	0.1 U	0.1 UN	0.1 U	0.1 UN	0.1 U	0.1 U	0.2	0.1	2
Nickel	4.1 B	3.5 B	4.1 B	0.5 U	0.5 U	5.7 B	3.7 B	10.8 B	11.1 B	11.5 B	53	20	73
Potassium	1,500 B	1,480 B	1,890 B	644 B	851 B	710 B	919 B	1,320 B	1,700 B	1,560 B	2,018	1,859	--
Selenium	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	11.2	5	18
Silver	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.87 B	5	5	18
Sodium	22,300	22,200	23,500	10,600	11,300	10,400	11,100	9,570	10,200	9540	180	190000	--
Thallium	1.9 U	1.9 U	<b>3.1 B</b>	1.9 U	<b>2.7 B</b>	1.9 U	<b>2.7 B</b>	1.9 U	1.9 U	<b>2.1 B</b>	5	5	0.26
Vanadium	0.92 B	0.79 B	0.4 U	<b>1.6 B</b>	0.4 U	1.1 B	0.4 U	0.84 B	0.4 U	0.44 B	15	5	1.1
Zinc	15.4 B	15.8 B	14.6 B	6 B	2.8 B	10.9 B	9.2 B	21.9	23.9	21.6	157	520	1,100

Notes:

(1) 95th UCL background concentrations for Fort Eustis groundwater (from Montgomery Watson Fort Eustis Background Study)

(2) PALs - Project Action Limits as established in the Final ROD

**550** Indicates detect above PAL but below Fort Eustis background

**Data Qualifiers:**

- U Not detected
- B Analyte present. Reported value between MDL and PQL
- E Estimated value because the serial dilutions are not within 10%.
- N Sample spike recovery is outside of control limits.

**TABLE 2  
SOIL AND SEDIMENT - PESTICIDE RESULTS  
2005 LTM PROGRAM - DOL STORAGE YARD SITE**

Compound	Results (ug/kg)											PAL
	SW1-1	SW1-2	SW1-2 (dup)	SW2-1	SW2-2	SW3-1	SW3-2	SW4-1	SW5-1	FWET-1	FWET-2	
<b>Pesticide COCs</b>												
DDD	2.9	3.9	3.7	1.9 U	4.1	4.3	3.6	3.2	2.4	79 D	10 D	100
DDE	11	11	8.7	0.79 JP	1.0 P	3.9	13	4.2	1.3	140 D	35 D	100
DDT	9.3	13	12	2.8 U	8.4	15	8.5	1.7 J	3.1 J	83 D	23 D	100
<b>Total DDD/DDE/DDT</b>	<b>23.2</b>	<b>27.9</b>	<b>24.4</b>	<b>0.8</b>	<b>13.5</b>	<b>23.2</b>	<b>25.1</b>	<b>9.1</b>	<b>6.8</b>	<b>302</b>	<b>67</b>	100
<b>Other Pesticides</b>												
Aldrin	0.48 U	0.48 U	0.47 U	0.25 J	0.48 U	0.5 U	0.49 U	0.58 U	0.57 U	6.1 U	3.8 U	100 <sup>(1)</sup>
BHC (beta)	0.95 U	0.94 U	0.93 U	0.94	0.78 JP	0.99 U	0.97 U	1.1 U	1.1 U	12 U	7.4 U	100,000 <sup>(1)</sup>
Chlordane (alpha)	2.6	2.6	1.6	0.38 JP	0.94 U	0.99 U	0.97 U	1.4 P	1.1 U	8.1 DJ	7.4 U	100 <sup>(1)</sup>
Chlordane (gamma)	2.2 P	2.2 P	2.9 P	0.47 U	0.48 U	0.5 U	0.49 U	0.58 U	0.57 U	6.1 U	3.8 U	100 <sup>(1)</sup>
Heptachlor	0.14 J	0.17 J	0.16 JP	0.47 U	0.26 J	0.5 U	0.49 U	0.29 J	0.15 J	6.1 U	3.8 D	---

**Notes:** **550** Bolded text indicates analyte was detected.

**550** Indicates detect above PAL

**PAL** Project Action Limit from Final ROD

**Data Qualifiers:**

U Not detected

J Analyte present. Reported value between MDL and PQL

D Secondary Dillution

P Greater than 25% difference in 2 GC column results

(1) EPA BTAG limit for soil (August 1995) (No sediment BTAG limits available for these pesticides)

**TABLE 3**  
**SOIL AND SEDIMENT - PAH RESULTS**  
**2005 LTM PROGRAM - DOL STORAGE YARD SITE**

Compound	Results (ug/kg)											PAL
	SW1-1	SW1-2	SW1-2 (dup)	SW2-1	SW2-2	SW3-1	SW3-2	SW4-1	SW5-1	FWET-1	FWET-2	
<b>PAH COCs</b>												
Benzo(a)anthracene	380 U	<b>33 J</b>	370 U	370 U	380 U	390 U	380 U	450 U	450 U	<b>93 J</b>	590 U	750
Benzo(a)pyrene	380 U	<b>31 J</b>	370 U	370 U	380 U	390 U	<b>29 J</b>	450 U	450 U	<b>98 J</b>	<b>49 J</b>	70
Benzo(b)fluoranthene	380 U	380 U	370 U	370 U	380 U	390 U	380 U	450 U	450 U	<b>93 J</b>	590 U	750
Benzo(k)fluoranthene	380 U	<b>40 J</b>	370 U	370 U	380 U	390 U	380 U	450 U	450 U	<b>110 J</b>	<b>52 J</b>	7,460
Dibenzo(a,h)anthracene	380 U	380 U	370 U	370 U	380 U	390 U	380 U	450 U	450 U	480 U	590 U	70
Indeno(1,2,3-cd)pyrene	380 U	<b>26 J</b>	370 U	370 U	380 U	390 U	<b>26 J</b>	450 U	450 U	<b>82 J</b>	<b>47 J</b>	750
<b>Other PAHs</b>												
Benzo(g,h,i)perylene	380 U	380 U	370 U	370 U	380 U	390 U	380 U	450 U	450 U	<b>78 J</b>	<b>46 J</b>	670 <sup>(1)</sup>
Chrysene	380 U	<b>44 J</b>	370 U	370 U	380 U	390 U	380 U	450 U	450 U	<b>100 J</b>	<b>51 J</b>	384 <sup>(1)</sup>
Fluoranthene	<b>26 J</b>	<b>49 J</b>	<b>24 J</b>	370 U	380 U	<b>41 J</b>	<b>45 J</b>	450 U	450 U	<b>190 J</b>	<b>72 J</b>	600 <sup>(1)</sup>
Phenanthrene	380 U	380 U	370 U	370 U	380 U	390 U	380 U	450 U	450 U	<b>74 J</b>	590 U	240 <sup>(1)</sup>
Pyrene	380 U	<b>52 J</b>	370 U	370 U	380 U	390 U	<b>38 J</b>	450 U	450 U	<b>140 J</b>	<b>63 J</b>	665 <sup>(1)</sup>

**Notes:** **550** Bolded text indicates analyte was detected.  
**550** Indicates detect above PAL

**Data Qualifiers:**  
U Not detected  
J Analyte present. Reported value between MDL and PQL

**PAL** Project Action Limit from Final ROD

(1) EPA BTAG limit for sediment (August 1995)

**TABLE 4**  
**GROUNDWATER - METAL COC RESULTS**  
**2005 LTM PROGRAM**  
**DOL STORAGE YARD SITE**

Metals	Monitoring Well I.D. and Sample Results in ug/l										Background Concentrations <sup>(1)</sup>		PALs <sup>(2)</sup>
	MW-5				MW-9		MW-10S		MW-11		Total	Dissolved	
	Total	Total (dup)	Dissolved	Dissolved (dup)	Total	Dissolved	Total	Dissolved	Total	Dissolved			
Aluminum	137 B	146 B	52.3 B	53.8 B	348	45.2 B	55.3 B	15.5 B	2,460	210 B	7,628	100	3,700
Antimony	<b>3.7 B</b>	<b>2.8 B</b>	1.6 U	1.6 U	<b>2.5 B</b>	1.6 U	<b>2.8 B</b>	1.6 U	<b>5.3 B</b>	1.6 U	250	25	1.5
Arsenic	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	17	5	0.045
Barium	68.6 B	71.6 B	73.4 B	73.7 B	35.2 B	33.7 B	40.2 B	41.8 B	74 B	49.3 B	243	112	260
Beryllium	0.51 B	0.51 B	0.39 B	0.4 B	0.36 B	0.17 B	0.32 B	0.19 B	0.5 B	0.21 B	6	2.5	4
Cadmium	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.22 B	6	9	1.8
Calcium	3,290 B	3,440 B	3,570 B	3,580 B	22,100	22,300	16,100	17,000	9,100	8,400	14,000	15,000	--
Chromium	1 B	1.6 B	0.6 U	0.6 U	1.9 B	0.6 U	0.64 B	0.6 U	6.5 B	0.96 B	37	5	11
Cobalt	3.4 B	3.9 B	4.3 B	4.4 B	0.52 B	0.5 U	0.61 B	1.3 B	1.7 B	0.72 B	12	10	73
Copper	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	1.6 B	0.6 U	52	12.5	150
Iron	156 N	167 N	12.2 U	18.8 B	<b>2,910 N</b>	<b>2,170</b>	<b>2,760 N</b>	<b>2,350</b>	<b>3,000 N</b>	359	14,979	5,192	1,100
Lead	1.6 B	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	2.8 B	1.1 U	55	6	15
Magnesium	3,180 B	3,330 B	3,510 B	3,520 B	3,910 B	3,990 B	2,840 B	3,080 B	4,970 B	4,440 B	16,474	17,325	--
Manganese	34.7	36.3	36.9	37.1	<b>239</b>	<b>240</b>	<b>76.7 E</b>	<b>81.2</b>	22.1	10.3	383	383.1	73
Mercury	0.1 U	0.1 UN	0.1 U	0.1 U	0.1 UN	0.1 U	0.1 U	0.1 U	0.1 UN	0.1 U	0.2	0.1	2
Nickel	6.3 B	5.6 B	5.9 B	5.9 B	0.9 U	0.9 U	3.3 B	3.6 B	16.3 B	12.9 B	53	20	73
Potassium	2,400 B	2,500 B	3,020 B	3,040 B	935 B	992 B	898 B	1,110 B	2,350 B	1,960 B	2,018	1,859	--
Selenium	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	11.2	5	18
Silver	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	5	5	18
Sodium	27,000	28,100	29,900	30,100	11,200	11,200	10,500	11,100	9,110	8,350	180	190000	--
Thallium	4.5 UN	4.5 UN	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	5	5	0.26
Vanadium	0.5 U	0.5 U	0.5 U	0.5 U	<b>1.4 B</b>	0.5 U	0.5 U	0.5 U	<b>5.6 B</b>	0.5 U	15	5	1.1
Zinc	15.9 B	16 B	23 B	23.4 B	3.7 B	3.2 B	7.8 B	8.5 B	33.9	25.8	157	520	1,100

Notes:

(1) 95th UCL background concentrations for Fort Eustis groundwater (from Montgomery Watson Fort Eustis Background Study)

(2) PALs - Project Action Limits as established in the Final ROD

**Data Qualifiers:**

- U Not detected
- B Analyte present. Reported value between MDL and PQL
- E Estimated value because the serial dilutions are not within 10%.
- N Sample spike recovery is outside of control limits.

**550** Indicates detect above PAL but below Fort Eustis background

**TABLE 2**  
**SOIL AND SEDIMENT - PESTICIDE RESULTS (MAY 2007)**  
**2007 LTM PROGRAM - DOL STORAGE YARD SITE**  
**FORT EUSTIS, VIRGINIA**

Results (ug/kg)									
Compound	PAL	SW1-1	SW1-2	SW2-1	SW2-2	SW3-1*	SW3-2*	SW4-1*	SW5-1
<b>Pesticide COCs</b>									
DDD	100	1.6 J	1 J	1.9 U	0.99 J	3.7 JP	20 J	8.3	2.4 J
DDE	100	4.4	5.7	1.7 J	5.5	13	38	6	41
DDT	100	9.7	5.9	1.9	12	3.1 J	38	4.3 U	21
<b>Total DDD / DDE / DDT</b>	<b>100</b>	<b>15.7</b>	<b>12.6</b>	<b>3.6</b>	<b>18.49</b>	<b>19.8</b>	<b>96</b>	<b>14.3</b>	<b>64.4</b>

Results (ug/kg)												
Compound	PAL	FWET-1*	FWET-1 dup*	FWET-2	FWET-3	FWET-4	FWET-5	FWET-6	FWET-7	FWET-8	FWET-9	FWET-10
<b>Pesticide COCs</b>												
DDD	100	5.7	<b>100</b>	8.5	6.4	2.1	10 J	10	5.9	29	5.4	6.6
DDE	100	3.2 J	7 J	12	5.8	11	11 J	8.2	7.1	80	8.1	14
DDT	100	4.2 U	<b>130</b>	11	3.7 P	4.9	<b>120</b>	28	4.4	<b>190</b>	3.6	5.9
<b>Total DDD / DDE / DDT</b>	<b>100</b>	<b>8.9</b>	<b>237</b>	<b>31.5</b>	<b>15.9</b>	<b>18</b>	<b>141</b>	<b>46.2</b>	<b>17.4</b>	<b>299</b>	<b>17.1</b>	<b>26.5</b>

**Notes:** **550** Bolded text indicates analyte was detected.  
**550** Bold and shaded text indicates analyte is above PAL.  
**PAL** Project Action Limit from Final ROD.  
 \* August 2007 data used.

**Data Qualifiers:**  
 U Not detected.  
 J Estimated value: value is between MDL and PQL.  
 P Greater than 25% difference in 2 gas chromatograph column results.

**TABLE 3**  
**SOIL AND SEDIMENT - PESTICIDE RESULTS (NOVEMBER 2007)**  
**2007 LTM PROGRAM - DOL STORAGE YARD SITE**  
**FORT EUSTIS, VIRGINIA**

Results (ug/kg)										
Compound	PAL	SW1-1	SW1-2	SW2-1	SW2-2	SW3-1	SW3-2	SW4-1	SW4-1 dup	SW5-1
Pesticide COCs										
DDD	100	2.3 J	4.5 J	3.7 U	2.3 J	2.4 J	6.6	9.9 J	6.9	5.2 J
DDE	100	10	8.6 J	3.7 U	2.8 J	7.5	16	26	23	2.8 J
DDT	100	18	99	2.2 B	5.6	54	15	110	7.4	59
<b>Total DDD / DDE / DDT</b>	<b>100</b>	<b>30.3</b>	<b>112.1</b>	<b>2.2</b>	<b>10.7</b>	<b>63.9</b>	<b>37.6</b>	<b>145.9</b>	<b>37.3</b>	<b>67</b>

Results (ug/kg)												
Compound	PAL	FWET-1	FWET-2	FWET-2 dup	FWET-3	FWET-4	FWET-5	FWET-6	FWET-7	FWET-8	FWET-9	FWET-10
Pesticide COCs												
DDD	100	2.9 J	8.5 J	8.1	7.2	6.8	3.6 J	8 JP	40 U	31	3.8 J	37
DDE	100	2.7 J	7.7 J	8.5	6.7	7.8	4.6	4.4 J	40 U	110	6.1	150
DDT	100	56 B	73	39	8.9	4 B	3.5 B	73	230	66	14 P	170 P
<b>Total DDD / DDE / DDT</b>	<b>100</b>	<b>61.6</b>	<b>89.2</b>	<b>55.6</b>	<b>22.8</b>	<b>18.6</b>	<b>11.7</b>	<b>85.4</b>	<b>230</b>	<b>207</b>	23.9	<b>357</b>

Notes: **550** Bolded text indicates analyte was detected.  
**550** Bold and shaded text indicates analyte is above PAL.  
**PAL** Project Action Limit from Final ROD.

Data Qualifiers:  
U Not detected.  
J Estimated value: value is between MDL and PQL.  
P Greater than 25% difference in 2 gas chromatograph column results.  
B Blank contamination.

**TABLE 4**  
**SOIL AND SEDIMENT - PAH RESULTS (MAY 2007)**  
**2007 LTM PROGRAM - DOL STORAGE YARD SITE**  
**FORT EUSTIS, VIRGINIA**

Results (ug/kg)										
Compound	PAL	SW1-1	SW1-2	SW2-1	SW2-2	SW3-1	SW3-1 dup	SW3-2*	SW4-1	SW5-1
<b>PAH COCs</b>										
Benzo(a)anthracene	<b>750</b>	380 U	370 U	380 U	380 U	81 J	100 J	140 J	89 J	420 U
Benzo(a)pyrene	<b>70</b>	380 U	370 U	380 U	380 U	<b>110 J</b>	<b>120 J</b>	<b>170 J</b>	<b>93 J</b>	420 U
Benzo(b)fluoranthene	<b>750</b>	380 U	370 U	380 U	380 U	97 J	100 J	170 J	87 J	420 U
Benzo(k)fluoranthene	<b>7,460</b>	380 U	370 U	380 U	380 U	120 J	140 J	200 J	100 J	420 U
Dibenzo(a,h)anthracene	<b>70</b>	380 U	370 U	380 U	380 U	350 U	350 U	390 U	360 U	420 U
Indeno(1,2,3-cd)pyrene	<b>750</b>	380 U	370 U	380 U	380 U	68 J	79 J	92 J	55 J	420 U

Results (ug/kg)											
Compound	PAL	FWET-1*	FWET-2	FWET-3	FWET-4	FWET-5	FWET-6	FWET-7	FWET-8	FWET-9	FWET-10
<b>PAH COCs</b>											
Benzo(a)anthracene	<b>750</b>	95 J	480 U	NS							
Benzo(a)pyrene	<b>70</b>	<b>87 J</b>	480 U	NS							
Benzo(b)fluoranthene	<b>750</b>	93 J	480 U	NS							
Benzo(k)fluoranthene	<b>7,460</b>	100 J	480 U	NS							
Dibenzo(a,h)anthracene	<b>70</b>	430 U	480 U	NS							
Indeno(1,2,3-cd)pyrene	<b>750</b>	40 J	480 U	NS							

**Notes:**

- 550** Bolded text indicates analyte was detected.
- 550** Bold and shaded text indicates analyte is above PAL.
- PAL** Project Action Limit from Final ROD.
- \* Re-extraction analysis: higher of the two analyses presented.
- NS Not sampled.

**Data Qualifiers:**

- U Not detected.
- J Estimated value: value is between MDL and PQL.

**TABLE 5**  
**SOIL AND SEDIMENT - PESTICIDE RESULTS (NOVEMBER 2007)**  
**2007 LTM PROGRAM - DOL STORAGE YARD SITE**  
**FORT EUSTIS, VIRGINIA**

Results (ug/kg)										
Compound	PAL	SW1-1	SW1-2	SW2-1	SW2-2	SW3-1	SW3-2	SW4-1	SW4-1dup	SW5-1
<b>PAH COCs</b>										
Benzo(a)anthracene	<b>750</b>	94 U	94 U	94 U	96 U	<b>90</b> J	110 U	120 U	110 U	110 U
Benzo(a)pyrene	<b>70</b>	94 U	94 U	94 U	96 U	92 U	110 U	120 U	110 U	110 U
Benzo(b)fluoranthene	<b>750</b>	94 U	94 U	94 U	96 U	92 U	110 U	120 U	110 U	110 U
Benzo(k)fluoranthene	<b>7,460</b>	94 U	94 U	94 U	96 U	<b>80</b> J	110 U	120 U	110 U	110 U
Dibenzo(a,h)anthracene	<b>70</b>	94 U	94 U	94 U	96 U	92 U	110 U	120 U	110 U	110 U
Indeno(1,2,3-cd)pyrene	<b>750</b>	94 U	94 U	94 U	96 U	92 U	110 U	120 U	110 U	110 U

Results (ug/kg)												
Compound	PAL	FWET-1	FWET-2	FWET-2 dup	FWET-3	FWET-4	FWET-5	FWET-6	FWET-7	FWET-8	FWET-9	FWET-10
<b>PAH COCs</b>												
Benzo(a)anthracene	<b>750</b>	94 U	<b>180</b>	110 U	<b>2,700</b>	110 U	110 U	110 U	100 U	120 U	110 U	150 U
Benzo(a)pyrene	<b>70</b>	94 U	<b>120</b>	110 U	<b>2,000</b>	110 U	110 U	110 U	100 U	120 U	110 U	150 U
Benzo(b)fluoranthene	<b>750</b>	94 U	110 U	110 U	<b>2,600</b>	110 U	110 U	110 U	100 U	120 U	110 U	150 U
Benzo(k)fluoranthene	<b>7,460</b>	94 U	<b>130</b>	110 U	<b>1,800</b>	110 U	110 U	110 U	100 U	120 U	110 U	<b>160</b>
Dibenzo(a,h)anthracene	<b>70</b>	94 U	110 U	110 U	<b>400</b>	110 U	110 U	110 U	100 U	120 U	110 U	150 U
Indeno(1,2,3-cd)pyrene	<b>750</b>	94 U	110 U	110 U	<b>1,100</b>	110 U	110 U	110 U	100 U	120 U	110 U	150 U

**Notes:** **550** Bolded text indicates analyte was detected.  
**550** Bold and shaded text indicates analyte is above PAL.  
**PAL** Project Action Limit from Final ROD.

**Data Qualifiers:**  
U Not detected.  
J Estimated value: value is between MDL and PQL.

**TABLE 6**  
**GROUNDWATER - DISSOLVED METAL COC RESULTS (MAY 2007)**  
**2007 LTM PROGRAM - DOL STORAGE YARD SITE**  
**FORT EUSTIS, VIRGINIA**

Metals	Results (ug/L)					Background Concentrations <sup>(1)</sup>	PAL
	MW-5	MW-9	MW-10S	MW-10S dup	MW-11		
Aluminum	11.1 U	100	3,700				
Antimony	<b>3.4 B</b>	<b>3.2 B</b>	<b>4.8 B</b>	<b>3.4 B</b>	<b>4.1 B</b>	25	2
Arsenic	2.8 U	5	0				
Barium	<b>34.7 J</b>	<b>35.6 J</b>	<b>46.5 J</b>	<b>46.2 J</b>	<b>58.6 J</b>	112	260
Beryllium	0.2 U	0.2 U	0.2 U	0.2 U	<b>0.21 B</b>	3	4
Cadmium	0.4 UL	9	2				
Calcium	<b>1,890 J</b>	<b>23,000 J</b>	<b>21,100 J</b>	<b>21,100 J</b>	<b>9,280 J</b>	15,000	--
Chromium	0.3 UL	5	11				
Cobalt	<b>1.5 B</b>	0.9 U	0.9 U	0.9 U	0.9 U	10	73
Copper	0.6 U	13	150				
Iron	10 UL	<b>2,310</b>	<b>3,620</b>	<b>3,650</b>	10 UL	5,192	1,100
Lead	1 R	1 R	1 R	1 R	1 R	6	15
Magnesium	<b>1,670 J</b>	<b>3,990 J</b>	<b>3,440 J</b>	<b>3,460 J</b>	<b>6,090 J</b>	17,325	--
Manganese	<b>24.6 J</b>	<b>241 J</b>	<b>105 J</b>	<b>105 J</b>	<b>9.9 B</b>	383	73
Mercury	0.1 U	0.1	0.1 U	0.1	0.1	0	2
Nickel	0.8 U	0.8 U	<b>0.95 B</b>	0.8 U	<b>9.6 B</b>	20	73
Potassium	<b>1,330 JL</b>	<b>622 JL</b>	<b>680 JL</b>	<b>678 JL</b>	<b>1,330 JL</b>	1,859	--
Selenium	2.7 U	5	18				
Silver	1.2 U	5	18				
Sodium	<b>22,900 J</b>	<b>11,700 J</b>	<b>12,000 J</b>	<b>12,000 J</b>	<b>7,240 J</b>	190,000	--
Thallium	2.9 U	5	0				
Vanadium	0.5 U	5	1				
Zinc	<b>17.1 B</b>	<b>4.5 B</b>	<b>7.5 B</b>	<b>8.0 B</b>	<b>25.2</b>	520	1,100

**Notes:**

<b>550</b>	Bolded text indicates analyte was detected.
<b>550</b>	Bold and shaded text indicates analyte is above PAL, but below background concentration.
(1)	95th UCL background dissolved concentrations for Fort Eustis groundwater (from Montgomery Watson Ft Eustis Background Study).
<b>PAL</b>	Project Action Limit from Final ROD.

**Data Qualifiers:**

- U Not detected.
- J Estimated value: value is between MDL and PQL.
- L Value may be biased low.
- B Estimated value: value is greater than the IDL, but less than the CRDL.
- B** Blank contamination.
- R Unreliable result.

**TABLE 7**  
**GROUNDWATER - TOTAL AND DISSOLVED METAL COC RESULTS (NOVEMBER 2007)**  
**2007 LTM PROGRAM - DOL STORAGE YARD SITE**  
**FORT EUSTIS, VIRGINIA**

Metals	Monitoring Well I.D. and Sample Results (ug/L)											Background Concentrations <sup>(1)</sup>		PAL
	MW-5				MW-9		MW-10S		MW-11		Total	Dissolved		
	Total	Total (dup)	Dissolved	Dissolved (dup)	Total	Dissolved	Total	Dissolved	Total	Dissolved				
Aluminum	<b>629</b>	<b>273</b>	15 U	15 U	<b>208</b>	15 U	14.7 U	15 U	<b>26</b> J	15 U	7,628	100	3,700	
Antimony	<b>3</b> J	2.9 U	3 U	3 U	2.9 U	3 U	2.9 U	3 U	2.9 U	3 U	250	25	1.5	
Arsenic	3.2 U	3.2 U	3 U	3 U	3.2 U	3 U	3.2 U	<b>4</b> J	3.2 U	3 U	17	5	0.045	
Barium	<b>20.7</b> J	<b>19.6</b> J	<b>19</b> J	<b>19</b> J	<b>34.3</b> J	<b>36</b> J	<b>37.2</b> J	<b>42</b> J	<b>47.1</b> J	<b>52</b> J	243	112	260	
Beryllium	0.2 U	0.2 U	0 U	0 U	0.2 U	0 U	0.2 U	0 U	0.2 U	0 U	6	2.5	4	
Cadmium	<b>0.62</b> B	0.5 U	1 U	1 U	0.5 U	1 U	<b>0.5</b> B	1 U	0.5 U	1 U	6	9	1.8	
Calcium	<b>1,710</b> J	<b>1,700</b> J	<b>1,660</b> J	<b>1,640</b> J	<b>22,100</b>	<b>23,000</b>	<b>12,000</b>	<b>13,400</b>	<b>7,820</b>	<b>8,200</b>	14,000	15,000	--	
Chromium	<b>2.3</b> J	<b>1.5</b> J	1 U	1 U	0.5 U	1 U	0.5 U	1 U	<b>1.3</b> J	1 U	37	5	11	
Cobalt	<b>3.5</b> B	<b>2.8</b> B	2 U	2 U	1.6 U	2 U	<b>2.3</b> B	2 U	<b>2.0</b> B	2 U	12	10	73	
Copper	<b>2.2</b> B	<b>1.6</b> B	<b>2</b> B	<b>1</b> B	<b>2.7</b> B	<b>1</b> B	0.9 U	1 U	<b>1.1</b> B	<b>1</b> B	52	12.5	150	
Iron	<b>1,640</b>	<b>763</b>	10 UL	10 UL	<b>2,470</b>	<b>2,290</b>	<b>1,440</b>	<b>1,310</b>	<b>57.1</b> L	10 UL	14,979	5,192	1,100	
Lead	2.1 UL	2.1 UL	2 R	2 R	2.1 UL	2 R	2.1 UL	2 R	2.1 UL	2 R	55	6	15	
Magnesium	<b>956</b> J	<b>927</b> J	<b>891</b> J	<b>900</b> J	<b>3,840</b> J	<b>3,980</b> J	<b>2,750</b> J	<b>3,070</b> J	<b>4,430</b> J	<b>4,660</b> J	16,474	17,325	--	
Manganese	<b>18.5</b> J	<b>17.1</b> J	<b>15</b>	<b>15</b>	<b>241</b> J	<b>244</b>	<b>51.4</b> J	<b>58</b>	<b>8.6</b> J	<b>9</b> J	383	383	73	
Mercury	0.1 U	0.1 U	0 U	0 U	0.1 U	0 U	0.1 U	0 U	0.1 U	0 U	0.2	0.1	2	
Nickel	<b>2</b> J	<b>1.8</b> J	<b>2</b> J	<b>2</b> J	1.1 U	1 U	<b>3.9</b> J	<b>6</b> J	<b>11.5</b> B	<b>13</b> J	53	20	73	
Potassium	<b>1,170</b> L	<b>1,130</b> L	<b>1,390</b> L	<b>1,370</b> L	<b>609</b> L	<b>767</b> L	<b>615</b> L	<b>856</b> L	<b>1,190</b> L	<b>1,530</b> L	2,018	1,859	--	
Selenium	3.3 UL	3.3 UL	3 UL	3 UL	3.3 UL	3 UL	3.3 UL	3 UL	3.3 UL	3 UL	11.2	5	18	
Silver	0.5 U	0.5 U	1 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	5	5	18	
Sodium	<b>13,400</b> J	<b>13,600</b> J	<b>14,600</b>	<b>14,300</b>	<b>10,900</b> J	<b>11,100</b>	<b>9,970</b> J	<b>11,200</b>	<b>7,440</b> J	<b>7,610</b>	180	190000	--	
Thallium	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	5	5	0.26	
Vanadium	<b>2.2</b> B	<b>1.1</b> B	0 U	0 U	<b>0.4</b> B	0 U	0.4 U	0 U	<b>0.6</b> B	<b>1</b> B	15	5	1.1	
Zinc	<b>30.4</b>	<b>18</b> J	<b>13</b> J	<b>12</b> J	<b>8.9</b> J	<b>2</b> J	<b>11.3</b> J	<b>10</b> J	<b>24.9</b>	<b>24</b>	157	520	1,100	

Notes: **550** Bolded text indicates analyte was detected.  
**550** Bold and shaded text indicates analyte is above PAL, but below background concentration.  
(1) 95th UCL background concentrations for Fort Eustis groundwater (from Montgomery Watson Ft Eustis Background Study).  
**PAL** Project Action Limit from Final ROD.

Data Qualifiers:  
U Not detected.  
J Estimated value: value is between MDL and PQL.  
L Value may be biased low.  
B Estimated value: value is between the detection limit and reporting limit.  
R Unreliable result.

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**APPENDIX B – OIL/SLUDGE HOLDING POND ANALYTICAL  
DATA**

**MONTGOMERY WATSON RI DATA**

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**FIVE-YEAR REVIEW REPORT  
FORT EUSTIS, VIRGINIA**

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Table 4-16

**SOIL SAMPLES - 1990**  
**SITE 11C - OIL/SLUDGE HOLDING POND**  
**FORT EUSTIS, VIRGINIA**  
 Page 1 of 2

Parameters	MW125 JMM-90		MW126 JMM-90		MW127 JMM-90	
	0(a)	10	0	10	0	2
<b>Pest/PCBs (<math>\mu\text{g}/\text{kg-dry}</math>)</b>						
p,p'DDD	<4	<4	<4.8	<4.8	<5.6	37
p,p'DDE	<4	<4	4.8	<4.8	<5.6	<4.9
p,p'DDT	<4	<4	<4.8	<4.8	<5.6	11
<b>VOCs (<math>\mu\text{g}/\text{kg-dry}</math>)</b>						
Ethylbenzene	<10	<10	<12	<12	<14	<12
Toluene	<10	<10	<12	<12	<14	<12
m,p-Xylenes	<10	<10	<12	<12	<14	<12
1,2-Dichlorobenzene	<10	<10	<12	<12	<14	<12
1,3-Dichlorobenzene	<10	<10	<12	<12	<14	<12
o-Xylene	<10	<10	<12	<12	<14	<12
<b>BNAs (<math>\mu\text{g}/\text{kg-dry}</math>)</b>						
Phenanthrene	<1,000	<1,000	<1,200	<1,200	<1,400	<1,200
2-Methylnaphthalene	<1,000	<1,000	<1,200	<1,200	<1,400	<1,200
<b>TFH-H (<math>\mu\text{g}/\text{kg-dry}</math>)</b>	<10,000	<10,000	<12,000	<12,000	<14000	74,000
<b>Metals (mg/kg-dry)</b>						
Arsenic	5.5	3	3.0	3.0	4.6	3.7
Barium	24	18	65	63	66	62
Beryllium	<0.5	<0.5	<0.6	<0.6	<0.7	<0.6
Chromium	140	7.2	19	19	21	17
Copper	12	4.1	4.9	7.4	34	7.3
Mercury	0.04	0.06	0.05	<0.02	0.04	0.04
Nickel	<4	<4	7.9	8.5	7.5	6.4
Lead	460	10	17	13	28	19
Zinc	200	37	32	37	42	30
<b>Total Solids (%)</b>	NA	NA	84	84	71	81

Table 4-16

**SOIL SAMPLES - 1990**  
**SITE 11C - OIL/SLUDGE HOLDING POND**  
**FORT EUSTIS, VIRGINIA**  
 Page 2 of 2

Parameters	SB143		SB144			SB145	
	0	5	0	8	8-D	0	8
<b>Pest/PCBs (µg/kg-dry)</b>							
p,p'DDD	<4.6	<4.8	<5.1	<5.2	<5.1	<4.9	<4.9
p,p'DDE	<4.6	8.3	<5.1	<5.2	7.6	6.1	<4.9
p,p'DDT	6.9	<4.8	5.1	<5.2	<5.1	15	<4.9
<b>VOCs (µg/kg-dry)</b>							
Ethylbenzene	<11	<12	<13	130(J)	510(J)	<12	<12
Toluene	<11	<12	<13	78(J)	110(J)	<12	<12
m,p-Xylenes	<11	95	<13	260(J)	1,800(J)	<12	<12
1,2-Dichlorobenzene	<11	<12	<13	26(J)	<25(UJ)	<12	<12
1,3-Dichlorobenzene	<11	<12	<13	26(J)	<25(UJ)	<12	<12
o-Xylene	<11	<12	<13	260(J)	760(J)	<12	<12
<b>BNAs (µg/kg-dry)</b>							
Phenanthrene	<1,100	<1,200	<1,300	<1,300	1,300	<1,200	<1,200
2-Methylnaphthalene	<1,100	<1,200	<1,300	1,700	3,200	<1,200	<1,200
<b>TFH-H (µg/kg-dry)</b>	<11,000	75,000	<13,000	47,000	290,000	<12,000	<12,000
<b>Metals (mg/kg-dry)</b>							
Arsenic	5.7	6.0	6.0	<3.2	6.1	5.5	4.9
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	<0.6	<0.6	<0.6	0.6	<b>0.86</b>	<b>0.63</b>	0.69
Chromium	<b>17</b>	24	14	18	23	<b>18</b>	23
Copper	<b>9.7</b>	<b>20</b>	<b>14</b>	12	9.2	<b>15</b>	4.0
Mercury	0.06	0.04	0.05	<b>0.19</b>	<b>0.14</b>	0.04	0.02
Nickel	5.8	5.7	5.3	5.5	7.0	7.9	7.0
Lead	21	<b>76</b>	<b>28</b>	<b>23</b>	<b>18</b>	<b>26</b>	14
Zinc	32	<b>43</b>	41	<b>44</b>	<b>41</b>	41	37
<b>Total Solids (%)</b>	87	84	78	77	79	82	81

(a) = Sampling depth (feet) relative to ground surface.

(J) = Associated value is an estimated quantity. Results are qualitatively acceptable.

(UJ) = Associated non-detection is an estimated quantity. Results are qualitatively acceptable.

D = Duplicate sample

**43** = Exceeds surface or subsurface background soil values.

Table 4-17

**SOIL/SEDIMENT SAMPLES - 1993 AND 1994**  
**SITE 11C - OIL/SLUDGE HOLDING POND**  
**FORT EUSTIS, VIRGINIA**  
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Parameters	MS2903(10) MW 1993	SB2913(0) MW 1993	SB2914(0) MW 1993	SB2915(0) MW 1993	SB2916(0) MW 1993	DS4515(7) MW 1994	DS4516(6) MW 1994	DS4517(8) MW 1994	DS4518(8) MW 1994	SD29221 MW 1993	SD29222 MW 1993
<b>VOCs (µg/kg)</b>											
Acetone	<6.3	NA	NA	NA	NA	94	<58	<18,000	66	<7.0	<6.9
Chlorobenzene	<6.3	NA	NA	NA	NA	<6.2	<5.8	6,900	<6.1	<7.0	<6.9
m,p-Xylene (sum of isomers)	<6.3	NA	NA	NA	NA	<6.2	<5.8	52,000	<6.1	<7.0	<6.9
o-Xylene	<6.3	NA	NA	NA	NA	<6.2	<5.8	24,000	<6.1	<7.0	<6.9
Toluene	<6.3	NA	NA	NA	NA	<6.2	<5.8	<1,800	<6.1	26	7.4
<b>BNAs (µg/kg)</b>											
	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND
<b>Pest/PCBs (µg/kg)</b>											
	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND
<b>TFH (µg/kg)</b>											
TFH-H as Fuel	<13,000	NA	NA	NA	NA	<12,000	<12,000	36,000,000	<12,000	<14,000	<13,000
<b>Total Metals (mg/kg)</b>											
Aluminum	37,000	14,000	4,400	9,700	3,100	27,000	22,000	13,000	31,000	37,000	23,000
Arsenic	11	<10	<10	<10	<10	<2.5	<0.50	4.4	<2.5	2.4	4.6
Barium	120	48	32	41	20	54	71	900	79	1,100	1,400
Beryllium	8.7	0.54	<0.50	0.60	<0.50	0.98	0.64	0.9	0.80	0.83	0.93
Cadmium	<0.50	<0.50	0.51	<0.50	<0.50	<0.050	<0.50	19	<0.50	<0.50	<0.50
Calcium	390	2,200	1,200	1,200	650	<50	250	22,000	140	710	1,200
Chromium, Total	35	16	37	15	7.3	34	22	60	33	34	25
Cobalt	8.8	7.5	3.4	5.3	2.7	5.6	6.1	7.3	6.2	9.4	16
Copper	12	16	49	18	9.6	11	7.7	510	9.1	16	15
Iron	35,000	23,000	12,000	19,000	7,300	65,000	15,000	17,000	38,000	17,000	12,000
Lead	22	40	57	21	12	<0.50	13	230	16	20	17
Magnesium	1,400	1,300	550	1,200	440	1,300	1,200	1,700	1,500	1,600	1,400
Manganese	17	1,000	81	400	61	20	36	110	40	91	330
Mercury	0.036	0.089	0.099	0.044	<0.030	<0.030	0.043	9.8	0.051	0.099	0.078
Nickel	12	8.2	6.2	5.9	<4.0	8.5	8.1	29	10	12	11
Potassium	1,100	960	510	820	230	1,100	550	860	1,100	1,300	1,100
Silver	<1.0	1.0	<1.0	1.7	<1.0	<5.0	<1.0	170	<2.0	<1.0	<1.0
Sodium	150	120	560	980	<50	110	68	650	89	120	130
Vanadium	54	25	20	27	12	56	38	79	60	57	41
Zinc	43	90	190	80	64	33	45	1,800	34	43	55
<b>Miscellaneous (mg/kg)</b>											
Solids, Percent	78	78	82	25	79	81	86	39	81	72	75
Total Organic Carbon	2,900	NA	NA	32,000	NA	420	NA	210,000	980	NA	NA

NA = Not analyzed

43 = Exceeds surface or subsurface background soil values.

Table 4-18

**GROUNDWATER SAMPLES - 1990**  
**SITE 11C - OIL/SLUDGE HOLDING POND**  
**FORT EUSTIS, VIRGINIA**  
 Page 1 of 1

Parameters	GW125 JMM-90	GW125(R) JMM-90	GW125D JMM-90	GW125D(R) JMM-90	GW126 JMM-90	GW127 JMM-90
<b>VOCs (µg/l)</b>						
Benzene	<5.0(UJ)	NA	<5.0(UJ)	NA	1.2	5.6
Carbon disulfide	51(J)	NA	79(J)	NA	<0.5	<5
Chlorobenzene	<5.0(UJ)	NA	<5.0(UJ)	NA	0.6	<5
1,2-Dichloroethane	<5.0	NA	<5.0	NA	<0.5	<0.5
Ethylbenzene	<5.0(UJ)	NA	<5.0(UJ)	NA	<0.5	12
Toluene	<5.0(UJ)	NA	<5.0(UJ)	NA	<0.5	74
m,p-Xylenes	<5.0(UJ)	NA	<5.0(UJ)	NA	<0.5	110
o-Xylene	<5.0(UJ)	NA	<5.0(UJ)	NA	<0.5	57
<b>BNAs(µg/l)</b>	ND(UJ)	ND	ND(UJ)	ND	ND	ND(UJ)
<b>Pest/PCBs (µg/l)</b>	ND	NA	ND	NA	ND	ND
<b>TFH-H (mg/l)</b>	<0.1	NA	0.1	NA	0.2	0.9
<b>Total Metals (mg/l)</b>						
Arsenic	<0.010(UJ)	NA	0.013(J)	NA	<0.005	<0.025
Barium	0.10(J)	NA	0.18(J)	NA	1.4	0.68
Beryllium	<0.005(UJ)	NA	<0.005(UJ)	NA	0.014	0.005
Chromium	0.010(J)	NA	0.034(J)	NA	0.31	0.056
Copper	0.059(J,h)	NA	0.25(J)	NA	0.21	0.35
Mercury	<0.0002(UJ)	NA	0.0004(J)	NA	0.0002	0.0003
Nickel	<0.040(UJ)	NA	<0.040(UJ)	NA	0.18	0.059
Lead	0.036(J)	NA	0.10(J)	NA	0.075	0.098
Zinc	0.28(J)	NA	0.68(J)	NA	0.82	0.34
<b>Dissolved Metals (mg/l)</b>						
Barium	<0.10(UJ)	NA	<0.10(UJ)	NA	<0.1	0.14
Zinc	0.11(J)(h)	NA	0.031(J)(h)	NA	0.070(J)(h)	0.027(J)(h)
<b>Field Parameters(*)</b>						
Temperature (°C)	20.2	NA	20.2	NA	20.8	20.8
pH	6.6	NA	6.6	NA	5.1	6.8
Conductivity (µmho)	3,450	NA	3,450	NA	360	850
Turbidity (NTU)	256	NA	256	NA	2,768	2,912

- (h) = Concentration qualified due to equipment rinsate contamination.  
 (J) = Associated value is an estimated quantity. Results are qualitatively acceptable.  
 (UJ) = Associated non-detection is an estimated quantity. Results are qualitatively acceptable.  
 (R) = Resampling

\* = Field parameters measured after purging, and prior to sampling.

NA = Not analyzed  
 ND = Not detected

**Table 4-19**  
**FIELD PARAMETER RESULTS**  
**SITE 11C, OIL/SLUDGE HOLDING POND**  
**FORT EUSTIS, VIRGINIA**  
**Page 1 of 1**

Parameters	Site 11C MW125			Site 11C MW126			Site 11C MW127			Site 11C MW2903	
	E2S1 4/17/90	MW 6/6/93	MW 11/17/93	E2S1 4/20/90	MW 6/6/93	MW 11/17/93	E2S1 4/20/90	MW 6/6/93	MW 11/17/93	MW 6/5/93	MW 11/17/93
Dissolved Oxygen (mg/L)	NA	4.2	5.9	NA	3.0	5.5	NA	3.4	4.9	2.1	4.1
EC(µohms)	820	2,490	3,100	140	400	580	770	400	730	1,350	1,160
pH	6.84	7.12	7.03	5.26	5.51	4.84	6.43	5.40	6.75	6.41	6.12
PID (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Salinity (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Potential (mV)	NA	NA	75.0	NA	NA	253	NA	NA	285	NA	52.0
Turbidity (NTU)	NA	9.1	160	NA	24.8	177	NA	23.4	569	15.0	461
Water Temp (Celsius)	12.0	17.1	17.9	13.8	18.0	17.4	14.5	18.0	18.2	20.8	17.8

NA = Not analyzed

Table 4-20

**WATER SAMPLES - 1993 AND 1994**  
**SITE 11C - OIL/SLUDGE HOLDING POND**  
**FORT EUSTIS, VIRGINIA**  
 Page 1 of 1

Parameters	MW125 MW 1993	MW125* MW 1993	MW126 MW 1993	MW126* MW 1993	MW127 MW 1993	MW127* MW 1993	MW22127** MW 1993	MW2903 MW 1993	MW2903* MW 1993	DP4510 MW 1994	DP4511 MW 1994	DP4512 MW 1994
<b>VOCs (µg/l)</b>												
Benzene	NA	<1.0	NA	<1.0	NA	<1.0	<1.0	NA	<1.0	<5.0	<5.0	<1.0
Chlorobenzene	NA	<1.0	NA	<1.0	NA	<1.0	<1.0	NA	<1.0	<5.0	<5.0	<1.0
1,2-Dichloroethane	NA	1.8	NA	<1.0	NA	<1.0	<1.0	NA	<1.0	<5.0	<5.0	<1.0
Carbon Disulfide	NA	<1.0	NA	<1.0	NA	<1.0	<1.0	NA	<1.0	<5.0	<5.0	2.1
Ethylbenzene	NA	<1.0	NA	<1.0	NA	3.8	3.6	NA	<1.0	16	<5.0	<1.0
m,p-Xylene (sum of isomers)	NA	<1.0	NA	<1.0	NA	<1.0	<1.0	NA	<1.0	49	<5.0	<1.0
o-Xylene	NA	<1.0	NA	<1.0	NA	<1.0	<1.0	NA	<1.0	6.0	<5.0	<1.0
Toluene	NA	1.0	NA	<1.0	NA	<1.0	<1.0	NA	<1.0	<5.0	<5.0	<1.0
<b>BNAs (µg/l)</b>												
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>Pest/PCBs (µg/l)</b>												
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>TFH (µg/l)</b>												
TFH-H as Fuel	<300	NA	570	NA	<300	NA	NA	<300	NA	NA	NA	NA
<b>Total Metals (mg/l)</b>												
Aluminum	0.23	NA	0.28	NA	0.98	NA	NA	<0.20	NA	NA	NA	NA
Barium	0.634	NA	0.053	NA	0.12	NA	NA	0.33	NA	NA	NA	NA
Calcium	630	NA	16	NA	160	NA	NA	25	NA	NA	NA	NA
Iron	1.7	NA	0.8	NA	1.0	NA	NA	71	NA	NA	NA	NA
Magnesium	50	NA	13	NA	13	NA	NA	23	NA	NA	NA	NA
Manganese	5.7	NA	1.4	NA	0.067	NA	NA	0.74	NA	NA	NA	NA
Potassium	14	NA	<1.0	NA	2.7	NA	NA	1.5	NA	NA	NA	NA
Silicon (as SiO <sub>2</sub> )	27	NA	27	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	37	NA	39	NA	6.6	NA	NA	160	NA	NA	NA	NA
Zinc	1.4	NA	0.043	NA	0.021	NA	NA	0.024	NA	NA	NA	NA
<b>Dissolved Metals (mg/l)</b>												
Aluminum	<0.20	NA	<0.20	NA	<0.20	NA	NA	0.47	NA	NA	NA	NA
Barium	0.030	NA	0.050	NA	0.11	NA	NA	0.33	NA	NA	NA	NA
Calcium	610	NA	16	NA	160	NA	NA	24	NA	NA	NA	NA
Cobalt	0.019	NA	0.033	NA	<0.010	NA	NA	<0.010	NA	NA	NA	NA
Iron	<0.050	NA	0.61	NA	<0.050	NA	NA	71	NA	NA	NA	NA
Lead	<0.0050	NA	<0.0050	NA	<0.0050	NA	NA	0.013	NA	NA	NA	NA
Magnesium	34	NA	14	NA	13	NA	NA	22	NA	NA	NA	NA
Manganese	2.5	NA	1.4	NA	0.099	NA	NA	0.74	NA	NA	NA	NA
Potassium	12	NA	<1.0	NA	2.4	NA	NA	1.9	NA	NA	NA	NA
Sodium	26	NA	41	NA	7.6	NA	NA	150	NA	NA	NA	NA
Zinc	0.76	NA	0.061	NA	<0.020	NA	NA	0.044	NA	NA	NA	NA
<b>Miscellaneous (mg/l)</b>												
Alkalinity, Total (as CaCO <sub>3</sub> )	430	NA	<1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	20	NA	47	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hardness (As CaCO <sub>3</sub> )	1,800	NA	95	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ammonia	0.14	NA	0.059	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Nitrate-Nitrite	2.6	NA	<0.050	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	1,400	NA	79	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (Residue, Filterable)	2,500	NA	370	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	9.5	NA	12	NA	NA	NA	NA	NA	NA	NA	NA	NA

\* = All samples resampled and reanalyzed for VOCs in November 1993.

\*\* = Duplicate of preceding sample.

NA = Not analyzed

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**APPENDIX D – OIL/SLUDGE HOLDING POND ANALYTICAL  
DATA**

**MALCOLM PIRNIE 2006 AND 2007 LTM DATA**

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**FIVE-YEAR REVIEW REPORT  
FORT EUSTIS, VIRGINIA**

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**TABLE 3**  
**ANALYTICAL RESULTS - DETECTED CONSTITUENTS**  
**LONG TERM MONITORING PROGRAM, OIL/SLUDGE HOLDING POND SITE**

Constituents	MCL (ug/l)	2006 Sampling Results - Samples results from February 2006.									
		MW-01		MW-126		MW-126DUP		MW-127		MW-2903	
		(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier
<b>TOTAL METALS</b>											
Aluminum	---	913		1050		824		139	B	101	B
Antimony	6	1.2	U	1.2	U	1.3	B	1.2	U	1.5	B
Barium	2,000	67.2	BE	41	BE	39.8	BE	94.8	BE	417	E
Beryllium	4.0	2.1	B	1.7	B	1.7	B	1.5	B	1.5	B
Cadmium	5.0	1.1	B	0.2	U	0.2	U	0.2	U	0.2	U
Calcium	---	97200	E	43600	E	43400	E	178000	E	27600	E
Chromium	100	2.7	B	1.4	B	1.4	B	0.4	U	0.75	B
Cobalt	---	131		35.2		35.6		0.5	U	17.4	
Iron	---	6440		15300		15200		162		75400	
Lead	15	3.1		2.5	B	2.3	B	2.2	B	1.8	B
Magnesium	---	70400	E	25400	E	25300	E	11400	E	28900	E
Manganese	---	9980	E	2810	E	2800	E	37.4	E	717	E
Nickel	---	55.4		15.7	B	15.7	B	0.9	U	5.4	B
Potassium	---	8020		345	B	310	B	1050	B	2450	B
Sodium	---	150000		30600		30900		6300		184000	
Vanadium	---	1.6	B	2.5	B	2.4	B	0.88	B	1.6	B
Zinc	---	432		15.9	B	16.5	B	0.3	U	0.3	U

**TABLE 3  
ANALYTICAL RESULTS - DETECTED CONSTITUENTS  
LONG TERM MONITORING PROGRAM, OIL/SLUDGE HOLDING POND SITE**

Constituents	MCL (ug/l)	2006 Sampling Results - Samples results from February 2006.									
		MW-01		MW-126		MW-126DUP		MW-127		MW-2903	
		(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier
<b>DISSOLVED METALS</b>											
Aluminum	---	171	B	77.1	B	79.5	B	31.1	B	58.5	B
Antimony	6	1.2	U	1.2	U	1.2	U	1.2	U	3.9	B
Arsenic	10	3.7	B	4.5	B	5.3	B	2.3	B	1.8	B
Barium	2,000	63.7	B	33.5	B	33	B	101	B	404	
Beryllium	4.0	2.1	B	1.5	B	1.5	B	1.2	B	1.2	B
Cadmium	5.0	1.6	B	0.2	U	0.2	U	0.2	U	0.2	U
Calcium	---	95700		44800		43800		197000		28100	
Chromium	100	0.66	B	0.4	U	0.4	U	0.4	U	0.51	B
Cobalt	---	132		35.7		36		0.5	U	17.5	
Iron	---	5470		14700		15000		20.5	B	73900	
Lead	15	1	U	1.2	B	1	U	1	U	1	U
Magnesium	---	71600		26400		26100		12600		29600	
Manganese	---	9840		2840		2790		38.4		714	
Nickel	---	55.3		16.1	B	16.2	B	0.9	U	6.1	B
Potassium	---	9430		285	B	283	B	1330	B	2930	B
Selenium	50	5.7		6.5		8.7		4.9	B	3.3	U
Sodium	---	156000		32300		32600		6520		190000	
Vanadium	---	0.3	U	0.79	B	0.64	B	0.8	B	1.5	B
Zinc	---	438		16	B	16.3	B	1.3	B	0.3	U

**Notes:**

Bolded values indicate positive detection of the compound

Shaded values indicate values above project action limits

U: Below Detection Limit value reported in MDL

E: Value is estimated due to matrix interference.

B: Value between MDL and PQL

**TABLE 3**  
**ANALYTICAL RESULTS - DETECTED CONSTITUENTS**  
**LONG TERM MONITORING PROGRAM, OIL/SLUDGE HOLDING POND SITE**

Constituents	MCL (ug/l)	Monitoring Wells and 2007 Sampling Results - Samples collected in May 2007											
		MW-01		MW-01DUP		MW-126		MW-127		MW-2903		MW-2903DUP	
		(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier	(ug/l)	Qualifier
<b>DISSOLVED METALS</b>													
Aluminum	---	<b>250</b>		<b>259</b>		11.1	U	11.1	U	11.1	U	11.1	U
Antimony	6	2.1	U	2.1	U	2.1	U	<b>2.2</b>	B	<b>2.9</b>	B	<b>4.3</b>	B
Arsenic	10	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U
Barium	2,000	<b>69.6</b>	BE	<b>71.3</b>	BE	<b>44.7</b>	BE	<b>96.4</b>	BE	<b>402</b>	E	<b>420</b>	E
Beryllium	4.0	<b>1.2</b>	B	<b>1.2</b>	B	0.2	U	0.2	U	0.2	U	0.2	U
Cadmium	5.0	<b>1.5</b>	B	<b>1.8</b>	B	0.4	U	0.4	U	0.4	U	0.4	U
Calcium	---	<b>127000</b>	E	<b>134000</b>	E	<b>83800</b>	E	<b>182000</b>	E	<b>28000</b>	E	<b>29400</b>	E
Chromium	100	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Cobalt	---	<b>189</b>		<b>205</b>		<b>36.7</b>		0.9	U	<b>13.7</b>		<b>15.9</b>	
Copper	1,300	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Iron	---	<b>11700</b>		<b>13100</b>		<b>15300</b>		<b>923</b>		<b>73100</b>		<b>76500</b>	
Lead	15	1	U	1	U	1	U	1	U	1	U	1	U
Magnesium	---	<b>92600</b>	E	<b>96700</b>	E	<b>42400</b>	E	<b>12000</b>	E	<b>27600</b>	E	<b>28800</b>	E
Manganese	---	<b>16000</b>		<b>17900</b>		<b>4550</b>		<b>117</b>		<b>763</b>		<b>801</b>	
Mercury	2	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	---	<b>70.9</b>		<b>76.6</b>		<b>12.8</b>	B	0.8	U	<b>2.8</b>	B	<b>3.1</b>	B
Potassium	---	<b>10200</b>	E	<b>11300</b>	E	<b>269</b>	BE	<b>1380</b>	BE	<b>2440</b>	BE	<b>2520</b>	BE
Selenium	50	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Silver	---	<b>1.2</b>	B	<b>1.4</b>	B	1.2	U	1.2	U	1.2	U	1.2	U
Sodium	---	<b>261000</b>	E	<b>279000</b>	E	<b>24600</b>	E	<b>11200</b>	E	<b>190000</b>	E	<b>197000</b>	E
<b>Thallium</b>	2	<b>4.7</b>	B	<b>7.7</b>	B	2.9	U	2.9	U	<b>6.4</b>	B	<b>4.8</b>	B
Vanadium	---	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Zinc	---	<b>657</b>		<b>776</b>		<b>41.8</b>		<b>4</b>	B	<b>2.6</b>	B	<b>2.8</b>	B
<b>VOCs</b>													
Methylene Chloride	5	5	U	5	U	5	U	<b>0.82</b>	B	5	U	5	U

**Notes:**

Bolded values indicate positive detection of the compound

Shaded values indicate values above project action limits

**Qualifiers:**

U: Below Detection Limit value reported in MDL

E: Value is estimated due to matrix interference.

J: Estimated value

B: Value between MDL and PQL

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**APPENDIX C – SITE INSPECTION PHOTOGRAPHS**

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**FIVE-YEAR REVIEW REPORT  
FORT EUSTIS, VIRGINIA**

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**U.S. ARMY TRANSPORTATION CENTER  
FORT EUSTIS, VIRGINIA**

5-Yr Review Site Insepction photos.Collected 11/19/07.



Landfill 1



Landfill 1



Landfill 1



Brown's Lake, from road illustrating signage.



Brown's lake from bridge.to the north (towards upper ditch).



Brown's lake from bridge.to the south (away from upper ditch).



Brown's Lake: from road into upper ditch (north).



Brown's Lake: from road into upper ditch (north).



Brown's Lake: from road south to lake showing signage.



LF 7: showing monitoring well, fencing, and gas venting. North Side.



LF 7: depicting fencing. North Side



LF 7: depicting fencing. North Side



Milstead Creek, from Road looking North.



Milstead Creek, from Road looking South..



Felker Fuel farm: monitoring well associated with RI.



Felker Fuel farm site, wooded area from south corner of fuel farm fenced area.



Felker Fuel farm wooded area from south corner of fuel farm fenced area.



Oil/Sludge site from access road.



Oil/Sludge site from access road.



Oil Sludge from dredge berm.



Oil/Sludge MW.



Oil/Sludge MW.



Oil/Sludge monitoring well across access road from oil/sludge area.



Fire Training Area. From west fenceline.



Eustis Lake signage.



Eustis Lake to the south from Road



Eustis Lake to the North from Road.



Eustis Lake from Harrison Road.



Eustis Lake to the East from Harrison Road.



Bailey Creek from Bailey Creek former IRA area.



Bailey Creek from Bailey Creek former IRA area.



Bailey Creek from Bailey Creek former IRA area.



Bailey Creek signage



Bailey Creek south bank looking north.



Storm water outfall to Bailey Creek from former Barracks Area.



Storm water outfall to Bailey Creek from former Barracks Area.



Storm water outfall to Bailey Creek from former Barracks Area.



Former Skeet/Trap Range from East Side.



Former Skeet/Trap Range from East Side.



Former Skeet/Trap Range looking south.



Former Skeet/Trap Range looking east



Tree line at edge of Former Skeet/Trap RAnge



Tree line along north edge of skeet/trap range.



Skeet Trap Range field looking east



Skeet wetland from road and signage



DOL fencing yard and signage



DOL wet area from road.



Drainage ditch from DOL storage yard.

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**APPENDIX D – SITE INSPECTION CHECKLISTS**

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**FIVE-YEAR REVIEW REPORT  
FORT EUSTIS, VIRGINIA**

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**U.S. ARMY TRANSPORTATION CENTER  
FORT EUSTIS, VIRGINIA**

## Site Inspection Checklist

I. SITE INFORMATION													
<b>Site name:</b> Bailey Creek	<b>Date of inspection:</b> 11/19/07												
<b>Location and Region:</b> Ft. Eustis, VA	<b>EPA ID:</b>												
<b>Agency, office, or company leading the five-year review:</b> Ft. Eustis ERM	<b>Weather/temperature:</b> Cloudy/50s												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input checked="" type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input checked="" type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input checked="" type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													
II. INTERVIEWS (Check all that apply)													
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													

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

Agency Jerry Hover  
 Contact EPA PM 11/19/07 (215) 814-2077  
 Name Title Date Phone no.  
 Problems; suggestions;  Report attached \_\_\_\_\_

Agency VDEQ  
 Contact Wade Smith PM 11/19/07 (804) 698-4125  
 Name Title Date Phone no.  
 Problems; suggestions;  Report attached \_\_\_\_\_

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

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

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


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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		_____	
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement</b> (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____		
	_____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability
	Areal extent _____		
	Remarks _____		
	_____		
<b>B. Benches</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
	_____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
	_____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____		
	_____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Outlet Pipes Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
2.	<b>Outlet Rock Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Siltation</b> Areal extent _____      Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____	
2.	<b>Erosion</b> Areal extent _____      Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____	
3.	<b>Outlet Works</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
4.	<b>Dam</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <span style="margin-left: 150px;"><input type="checkbox"/> Oil/water separation</span> <span style="margin-left: 150px;"><input type="checkbox"/> Bioremediation</span> <input type="checkbox"/> Air stripping <span style="margin-left: 150px;"><input type="checkbox"/> Carbon adsorbers</span> <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <span style="margin-left: 100px;"><input type="checkbox"/> Needs Maintenance</span> <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <span style="margin-left: 50px;"><input type="checkbox"/> Good condition</span> <span style="margin-left: 50px;"><input type="checkbox"/> Needs Maintenance</span> Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <span style="margin-left: 50px;"><input type="checkbox"/> Good condition</span> <span style="margin-left: 50px;"><input type="checkbox"/> Proper secondary containment</span> <span style="margin-left: 50px;"><input type="checkbox"/> Needs Maintenance</span> Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <span style="margin-left: 50px;"><input type="checkbox"/> Good condition</span> <span style="margin-left: 50px;"><input type="checkbox"/> Needs Maintenance</span> Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <span style="margin-left: 50px;"><input type="checkbox"/> Good condition (esp. roof and doorways)</span> <span style="margin-left: 100px;"><input type="checkbox"/> Needs repair</span> <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <span style="margin-left: 50px;"><input type="checkbox"/> Functioning</span> <span style="margin-left: 50px;"><input type="checkbox"/> Routinely sampled</span> <span style="margin-left: 50px;"><input type="checkbox"/> Good condition</span> <input type="checkbox"/> All required wells located <span style="margin-left: 50px;"><input type="checkbox"/> Needs Maintenance</span> <span style="margin-left: 50px;"><input type="checkbox"/> N/A</span> Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <span style="margin-left: 150px;"><input type="checkbox"/> Is of acceptable quality</span>		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <span style="margin-left: 50px;"><input type="checkbox"/> Contaminant concentrations are declining</span>		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION			
<b>Site name:</b> Brown's Lake	<b>Date of inspection:</b> 11/19/2007		
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>		
<b>Agency, office, or company leading the five-year review:</b>	<b>Weather/temperature:</b>		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
<b>1. O&amp;M site manager</b> _____        _____        _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			
<b>2. O&amp;M staff</b> _____        _____        _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>				
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A		
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement (Low spots)</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability
	Areal extent _____		
	Remarks _____ _____		
<b>B. Benches</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
	_____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
	_____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Evidence of leakage at penetration		
	Remarks _____		
	_____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>E. Gas Collection and Treatment</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b>	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks _____			
	_____			
2.	<b>Gas Collection Wells, Manifolds and Piping</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks _____			
	_____			
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
<b>F. Cover Drainage Layer</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
<b>G. Detention/Sedimentation Ponds</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____	Depth _____	<input type="checkbox"/> N/A	
	<input type="checkbox"/> Siltation not evident			
	Remarks _____			
	_____			
2.	<b>Erosion</b> Areal extent _____	Depth _____		
	<input type="checkbox"/> Erosion not evident			
	Remarks _____			
	_____			
3.	<b>Outlet Works</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
4.	<b>Dam</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____	
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>D. Monitoring Data</b>		
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality	
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION													
<b>Site name:</b> DOL Storage Yard	<b>Date of inspection:</b> 11/19/07												
<b>Location and Region:</b> Ft. Eustis, VA	<b>EPA ID:</b>												
<b>Agency, office, or company leading the five-year review:</b> Ft. Eustis ERM	<b>Weather/temperature:</b> Cloudy/50s												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													
II. INTERVIEWS (Check all that apply)													
<b>1. O&amp;M site manager</b> _____        _____        _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													
<b>2. O&amp;M staff</b> _____        _____        _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement (Low spots)</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____		
	_____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	Areal extent _____	<input type="checkbox"/> No evidence of slope instability	
	Remarks _____		
	_____		
<b>B. Benches</b>			
	<input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
<b>C. Letdown Channels</b>			
	<input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
	(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____ _____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____ _____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____ _____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____ _____		

<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Outlet Pipes Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
2.	<b>Outlet Rock Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Siltation</b> Areal extent _____      Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____	
2.	<b>Erosion</b> Areal extent _____      Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____	
3.	<b>Outlet Works</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
4.	<b>Dam</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION													
<b>Site name:</b> Landfill No. 7	<b>Date of inspection:</b> 11/19/07												
<b>Location and Region:</b> Ft. Eustis, VA	<b>EPA ID:</b>												
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis Environmental	<b>Weather/temperature:</b>												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input checked="" type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input checked="" type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input checked="" type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
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<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													
II. INTERVIEWS (Check all that apply)													
<b>1. O&amp;M site manager</b> _____        _____        _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													
<b>2. O&amp;M staff</b> _____        _____        _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>	
Remarks _____ _____ _____ _____ _____	
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Landfill Surface</b>	
1.	<b>Settlement</b> (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____
5.	<b>Vegetative Cover</b> <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input checked="" type="checkbox"/> N/A Remarks _____ _____
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	Areal extent _____	<input checked="" type="checkbox"/> No evidence of slope instability	
	Remarks _____ _____		
<b>B. Benches</b>			
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b>			
	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
5.	<b>Obstructions</b>	Type _____	<input checked="" type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
	_____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input checked="" type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
	_____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A	
	<input type="checkbox"/> Evidence of leakage at penetration		
	Remarks _____		
	_____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input checked="" type="checkbox"/> N/A		
	Remarks _____		
	_____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Outlet Pipes Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
2.	<b>Outlet Rock Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Siltation</b> Areal extent _____      Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____	
2.	<b>Erosion</b> Areal extent _____      Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____	
3.	<b>Outlet Works</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
4.	<b>Dam</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION			
<b>Site name:</b> Oil/sludge Holding Pond	<b>Date of inspection:</b> 11/19/07		
<b>Location and Region:</b> Ft. Eustis, VA	<b>EPA ID:</b>		
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b> Cloudy/ 50s		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
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<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
<b>1. O&amp;M site manager</b> _____        _____        _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			
<b>2. O&amp;M staff</b> _____        _____        _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>	
Remarks _____ _____ _____ _____ _____	
<b>VII. LANDFILL COVERS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Landfill Surface</b>	
1.	<b>Settlement (Low spots)</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____
5.	<b>Vegetative Cover</b> <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input checked="" type="checkbox"/> N/A Remarks _____ _____
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____

8.	<b>Wet Areas/Water Damage</b>	<input checked="" type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	Areal extent _____	<input checked="" type="checkbox"/> No evidence of slope instability	
	Remarks _____ _____		
<b>B. Benches</b>			
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b>			
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
	_____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
	_____		
<b>D. Cover Penetrations</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____		
	_____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input checked="" type="checkbox"/> N/A		
	Remarks _____		
	_____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Outlet Pipes Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
2.	<b>Outlet Rock Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Siltation</b> Areal extent _____      Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____	
2.	<b>Erosion</b> Areal extent _____      Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____	
3.	<b>Outlet Works</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
4.	<b>Dam</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION													
<b>Site name:</b> Eustis Lake	<b>Date of inspection:</b> 12/17/2007												
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>												
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b> Cloudy/50s												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													
II. INTERVIEWS (Check all that apply)													
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													



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

**IV. O&M COSTS**

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

2. **O&M Cost Records**  
 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 _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

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

**B. Other Access Restrictions**

1. **Signs and other security measures**              Location shown on site map     N/A  
 Remarks \_\_\_\_\_ No swimming, catch and release \_\_\_\_\_  
 \_\_\_\_\_

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement (Low spots)</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	Areal extent _____	<input type="checkbox"/> No evidence of slope instability	
	Remarks _____ _____		
<b>B. Benches</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____ _____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____ _____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____ _____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	Remarks _____ _____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	Remarks _____ _____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____ _____		

<b>E. Gas Collection and Treatment</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b>	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks _____			
	_____			
2.	<b>Gas Collection Wells, Manifolds and Piping</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks _____			
	_____			
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
<b>F. Cover Drainage Layer</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
<b>G. Detention/Sedimentation Ponds</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____	Depth _____	<input type="checkbox"/> N/A	
	<input type="checkbox"/> Siltation not evident			
	Remarks _____			
	_____			
2.	<b>Erosion</b> Areal extent _____	Depth _____		
	<input type="checkbox"/> Erosion not evident			
	Remarks _____			
	_____			
3.	<b>Outlet Works</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
4.	<b>Dam</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION													
<b>Site name:</b> Felker Airfield Tank FArm	<b>Date of inspection:</b> 12/17/2007												
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>												
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b>												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input checked="" type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input checked="" type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input checked="" type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													
II. INTERVIEWS (Check all that apply)													
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement (Low spots)</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability
	Areal extent _____		
	Remarks _____ _____		
<b>B. Benches</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____ _____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____ _____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____ _____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	Remarks _____ _____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	Remarks _____ _____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____ _____		

<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Outlet Pipes Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
2.	<b>Outlet Rock Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Siltation</b> Areal extent _____      Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____	
2.	<b>Erosion</b> Areal extent _____      Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____	
3.	<b>Outlet Works</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
4.	<b>Dam</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____	
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>D. Monitoring Data</b>		
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality	
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION			
<b>Site name:</b> Fire Training Area	<b>Date of inspection:</b> 12/17/2007		
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>		
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b> cloudy/50s		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			



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

**IV. O&M COSTS**

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

2. **O&M Cost Records**  
 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 _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

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

**B. Other Access Restrictions**

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

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement (Low spots)</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____		
	_____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	Areal extent _____	<input type="checkbox"/> No evidence of slope instability	
	Remarks _____		
	_____		
<b>B. Benches</b>			
	<input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____		
	_____		
<b>C. Letdown Channels</b>			
	<input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
	(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
	_____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
	_____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____		
	_____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>E. Gas Collection and Treatment</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b>	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks _____				
_____				
2.	<b>Gas Collection Wells, Manifolds and Piping</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks _____				
_____				
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
Remarks _____				
_____				
<b>F. Cover Drainage Layer</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
<b>G. Detention/Sedimentation Ponds</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____	Depth _____	<input type="checkbox"/> N/A	
	<input type="checkbox"/> Siltation not evident			
Remarks _____				
_____				
2.	<b>Erosion</b> Areal extent _____	Depth _____		
	<input type="checkbox"/> Erosion not evident			
Remarks _____				
_____				
3.	<b>Outlet Works</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
4.	<b>Dam</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION			
<b>Site name:</b> Fire Training Area	<b>Date of inspection:</b> 12/17/2007		
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>		
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b> cloudy/50s		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement</b> (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	Areal extent _____	<input type="checkbox"/> No evidence of slope instability	
	Remarks _____ _____		
<b>B. Benches</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____ _____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____ _____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____ _____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> N/A	
	Remarks _____ _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> N/A	
	Remarks _____ _____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> N/A	
	Remarks _____ _____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	<input type="checkbox"/> N/A		
	Remarks _____ _____		

<b>E. Gas Collection and Treatment</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b>	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks _____				
_____				
2.	<b>Gas Collection Wells, Manifolds and Piping</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks _____				
_____				
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
Remarks _____				
_____				
<b>F. Cover Drainage Layer</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
<b>G. Detention/Sedimentation Ponds</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____	Depth _____	<input type="checkbox"/> N/A	
	<input type="checkbox"/> Siltation not evident			
Remarks _____				
_____				
2.	<b>Erosion</b> Areal extent _____	Depth _____		
	<input type="checkbox"/> Erosion not evident			
Remarks _____				
_____				
3.	<b>Outlet Works</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
4.	<b>Dam</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____	
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>D. Monitoring Data</b>		
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality	
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION			
<b>Site name:</b> Former Skeet and Trap Range- Upland	<b>Date of inspection:</b> 11/19/07		
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>		
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b> Cloudy/50s		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____             </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls             </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement</b> (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability
	Areal extent _____		
	Remarks _____ _____		
<b>B. Benches</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____ _____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____ _____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____ _____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____ _____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____ _____		

<b>E. Gas Collection and Treatment</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b>	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks _____				
_____				
2.	<b>Gas Collection Wells, Manifolds and Piping</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks _____				
_____				
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
Remarks _____				
_____				
<b>F. Cover Drainage Layer</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
<b>G. Detention/Sedimentation Ponds</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____	Depth _____	<input type="checkbox"/> N/A	
	<input type="checkbox"/> Siltation not evident			
Remarks _____				
_____				
2.	<b>Erosion</b> Areal extent _____	Depth _____		
	<input type="checkbox"/> Erosion not evident			
Remarks _____				
_____				
3.	<b>Outlet Works</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				
4.	<b>Dam</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
_____				

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION			
<b>Site name:</b> Former Skeet and Trap Range- Wetland	<b>Date of inspection:</b> 11/19/07		
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>		
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b> Cloudy/50s		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____             </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls             </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement</b> (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	Areal extent _____	<input type="checkbox"/> No evidence of slope instability	
	Remarks _____ _____		
<b>B. Benches</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
	_____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
	_____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____		
	_____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>E. Gas Collection and Treatment</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b>	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks _____			
2.	<b>Gas Collection Wells, Manifolds and Piping</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks _____			
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____			
<b>F. Cover Drainage Layer</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
<b>G. Detention/Sedimentation Ponds</b>			<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____	Depth _____	<input type="checkbox"/> N/A	
	<input type="checkbox"/> Siltation not evident			
	Remarks _____			
2.	<b>Erosion</b> Areal extent _____	Depth _____		
	<input type="checkbox"/> Erosion not evident			
	Remarks _____			
3.	<b>Outlet Works</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
4.	<b>Dam</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION													
<b>Site name:</b> Milstead Island Creek	<b>Date of inspection:</b> 12/17/2007												
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>												
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b>												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													
II. INTERVIEWS (Check all that apply)													
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____													



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks _____ _____ _____ _____ _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement (Low spots)</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____	
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____	
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____	
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____ _____	
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____	

8.	<b>Wet Areas/Water Damage</b>	<input type="checkbox"/> Wet areas/water damage not evident	
	<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Areal extent _____
	<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Areal extent _____
	Remarks _____ _____		
9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	Areal extent _____	<input type="checkbox"/> No evidence of slope instability	
	Remarks _____ _____		
<b>B. Benches</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks _____ _____		
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____ _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____ _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____ _____		

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
	_____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
	_____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	<input type="checkbox"/> Evidence of leakage at penetration		
	Remarks _____		
	_____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Outlet Pipes Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
2.	<b>Outlet Rock Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Siltation</b> Areal extent _____      Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____	
2.	<b>Erosion</b> Areal extent _____      Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____	
3.	<b>Outlet Works</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
4.	<b>Dam</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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## Site Inspection Checklist

I. SITE INFORMATION			
<b>Site name:</b> Officer's Club LF 1	<b>Date of inspection:</b> 12/17/2007		
<b>Location and Region:</b> Fort Eustis, VA	<b>EPA ID:</b>		
<b>Agency, office, or company leading the five-year review:</b> Fort Eustis ERM	<b>Weather/temperature:</b>		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input checked="" type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
1. <b>O&amp;M site manager</b> _____ <u>N/A</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			
2. <b>O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			



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



<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input checked="" type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>	
Remarks _____ _____ _____ _____ _____	
<b>VII. LANDFILL COVERS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Landfill Surface</b>	
1.	<b>Settlement (Low spots)</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____
2.	<b>Cracks</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____                      Widths _____                      Depths _____ Remarks _____ _____
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____                      Depth _____ Remarks _____ _____
4.	<b>Holes</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____                      Depth _____ Remarks _____ _____
5.	<b>Vegetative Cover</b> <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input checked="" type="checkbox"/> N/A Remarks _____ _____
7.	<b>Bulges</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident Areal extent _____                      Height _____ Remarks _____ _____

8.	<b>Wet Areas/Water Damage</b> <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks _____ _____	<input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____
9.	<b>Slope Instability</b> <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks _____ _____	
<b>B. Benches</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	<b>Flows Bypass Bench</b> Remarks _____ _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
2.	<b>Bench Breached</b> Remarks _____ _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
3.	<b>Bench Overtopped</b> Remarks _____ _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	<b>Settlement</b> Areal extent _____    Depth _____ Remarks _____ _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of settlement
2.	<b>Material Degradation</b> Material type _____    Areal extent _____ Remarks _____ _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of degradation
3.	<b>Erosion</b> Areal extent _____    Depth _____ Remarks _____ _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of erosion

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
	_____		
5.	<b>Obstructions</b>	Type _____	<input checked="" type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
	_____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input checked="" type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
	_____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration		<input type="checkbox"/> N/A
	Remarks _____		
	_____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration		
	<input type="checkbox"/> N/A		
	Remarks _____		
	_____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
			<input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>E. Gas Collection and Treatment</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b>	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks _____			
	_____			
2.	<b>Gas Collection Wells, Manifolds and Piping</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks _____			
	_____			
3.	<b>Gas Monitoring Facilities</b> (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
<b>F. Cover Drainage Layer</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
<b>G. Detention/Sedimentation Ponds</b>			<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____	Depth _____	<input type="checkbox"/> N/A	
	<input type="checkbox"/> Siltation not evident			
	Remarks _____			
	_____			
2.	<b>Erosion</b> Areal extent _____	Depth _____		
	<input type="checkbox"/> Erosion not evident			
	Remarks _____			
	_____			
3.	<b>Outlet Works</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			
4.	<b>Dam</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
	Remarks _____			
	_____			

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement_____	Vertical displacement_____	
	Rotational displacement_____		
	Remarks_____		
	_____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks_____		
	_____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	G Vegetation does not impede flow		
	Areal extent_____	Type_____	
	Remarks_____		
	_____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks_____		
	_____		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent_____	Depth_____	
	Remarks_____		
	_____		
2.	<b>Performance Monitoring</b>	Type of monitoring_____	
	<input type="checkbox"/> Performance not monitored		
	Frequency_____	<input type="checkbox"/> Evidence of breaching	
	Head differential_____		
	Remarks_____		
	_____		

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		



**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.

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**D. Opportunities for Optimization**

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

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