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FINAL BASE WIDE SITE INSPECTION REPORT NRL CHESAPEAKE BEACH MD

06/01/2016

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Final

Base-wide Site Inspection Report
Naval Research Laboratory – Chesapeake Bay Detachment

Chesapeake Beach, Maryland

Contract Task Order JU01

June 2016

Prepared for

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Prepared by



Herndon, Virginia

Executive Summary

A Base-wide Site Inspection (SI) was performed at the Naval Research Laboratory – Chesapeake Bay Detachment (NRL-CBD) to determine whether historical practices lead to site-related releases to the environment associated with six environmental remediation sites and two areas of concern (AOCs). The areas included in the investigation were selected based on historical research presented in the *Base-Wide Site Inspection Uniform Federal Policy Sample and Analysis Plan* (CH2M HILL, Inc. [CH2M], 2012) and are summarized as follows.

TABLE ES-1
Summary of Investigation Areas

Investigation Area	Reason for Inclusion in the Investigation
Site 2 – Chemical Burial Area	Identified during the Initial Assessment Study (IAS)
Site 3 – Landfill No. 1	Identified during the IAS
Site 4 – Landfill No. 2	Identified during the IAS
Site 5 – Landfill No. 3	Identified during the IAS
Site 7 – Road Oil Application	Identified during the IAS
Site 9 – Photo-processing Waste	Identified during the IAS
AOC C – Chemical Burial Area 2	Identified in historical documents during research for the SI Uniform Federal Policy (UFP)-Sampling and Analysis Plan (SAP)
AOC D – Water Tower	Identified in historical documents during research for the SI UFP-SAP

The purpose of this document is to report the findings of the SI investigation based on the investigation objectives identified in UFP-SAP. The principal study questions from the UFP-SAP to be answered by this investigation are:

1. Have previous historical activities at Sites 2, 3, 4, 5, 7, or 9 or AOCs C and D resulted in a release of constituents to the surface soil, subsurface soil, or groundwater?
2. Do the concentrations detected in soil and groundwater suggest potential unacceptable human health or ecological risks?
3. Do media-specific concentrations warrant further investigation or remedial action to meet the Department of the Navy's (Navy's) preferred objective of unrestricted land use for the sites?

To support the SI, a field investigation consisting of a digital geophysical mapping (DGM) survey, test pitting, direct-push technology (DPT) soil and groundwater sampling, and analytical sample collection was performed. Analytical data generated during the investigation work were evaluated during a human health risk screening (HHRS) evaluation and an ecological risk screening (ERS) assessment to determine potential risks associated with site media. The results of the risk screenings are summarized as follows.

TABLE ES-2
Investigation Results Summary

Investigation Area	Recommendation
Site 2 – Chemical Burial Area	No further evaluation
Site 3 – Landfill No. 1	Further evaluation for human health (based on Maryland Department of the Environment target risk levels only) and ecological risks in surface soil.
Site 4 – Landfill No. 2	Further evaluation for human health and ecological risks in surface soil.
Site 5 – Landfill No. 3	Further evaluation for human health and ecological risks in surface soil.
Site 7 – Road Oil Application	Further evaluation for ecological risks in surface soil.
Site 9 – Photo-processing Waste	Further evaluation for ecological risks in surface soil.
AOC C – Chemical Burial Area 2	No further evaluation.
AOC D – Water Tower	Further evaluation for human health and ecological risks in surface soil.

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Acronyms and Abbreviations

µg/L	microgram per liter
amsl	above mean sea level
AOC	area of concern
ATC	Anticipated Typical Concentration
bgs	below ground surface
CLEAN	Comprehensive Long-term Environmental Action – Navy
COPC	chemical of potential concern
CSM	conceptual site model
DGM	digital geophysical mapping
DPT	direct-push technology
EM31	Geonics, Ltd., EM31
EPC	exposure point concentration
ER	environmental restoration
ERA	ecological risk assessment
ERS	ecological risk screening
ESV	ecological screening value
Freon-11	trichlorofluoromethane
ft^2	square foot
GPS	global positioning system
HHRS	human health risk screening
HI	hazard index
HQ	hazard quotient
IAS	Initial Assessment Study
MDE	Maryland Department of the Environment
mg/kg	milligram per kilogram
mS/ft	milliSiemens per foot
N/A	not applicable
NAEVA	NAEVA Geophysics
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NRL-CBD	Naval Research Laboratory – Chesapeake Bay Detachment
NRL-DC	Naval Research Laboratory – Washington, D.C.
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization
PLS	professional land surveyor
PPRTV	Provisional Peer Reviewed Toxicity Value
QC	quality control
RfD	reference dose
RSL	regional screening level
RTK	real-time kinematic

SAP	Sampling and Analysis Plan
SI	Site Inspection
SVOC	semivolatile organic compound
TOC	total organic carbon
UCL	upper confidence limit
UFP	Uniform Federal Policy
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit
VOC	volatile organic compound

SECTION 1

Introduction

CH2M prepared this document under the Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Atlantic Division, Comprehensive Long-term Environmental Action – Navy (CLEAN) 8012 Contract N62470-11-D-8012, Contract Task Order JU01, for submittal to NAVFAC Washington and the Maryland Department of the Environment (MDE), which serves as the lead regulatory agency. This document has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorizations Act of 1986.

This report presents the results of the Base-wide Site Inspection (SI) conducted at the Naval Research Laboratory – Chesapeake Bay Detachment (NRL-CBD) located in Chesapeake Beach, Maryland (**Figure 1-1**). Eight environmental restoration (ER) sites were presented in the Initial Assessment Study (IAS) (NEESA, 1984) as environmental sites located at NRL-CBD; new potential areas of concern (AOCs) were also identified through additional historical research. With the Finalization of the *Tier II Base Wide SI Uniform Federal Policy Sampling and Analysis Plan* (CH2M, 2012), MDE provided concurrence that Site 6, Site 8, AOC A, and AOC B did not warrant further investigation. Therefore, the Base-wide SI investigation focused on eight investigation areas within the facility limits (**Figure 1-2**), comprised of six ER sites and two AOCs (**Table 1-1**). This document has been developed to report the findings of the SI investigation based on the investigation objectives identified in the Final Uniform Federal Policy (UFP)-Sampling and Analysis Plan (SAP) (CH2M, 2012).

TABLE 1-1
Summary of Investigation Areas

Investigation Area	Reason for Inclusion in the Investigation
Site 2 – Chemical Burial Area	Identified during the IAS
Site 3 – Landfill No 1	Identified during the IAS
Site 4 – Landfill No 2	Identified during the IAS
Site 5 – Landfill No 3	Identified during the IAS
Site 7 – Road Oil Application	Identified during the IAS
Site 9 – Photo-processing Waste	Identified during the IAS
AOC C – Chemical Burial Area 2	Identified in historical documents during research for the SI UFP-SAP
AOC D – Water Tower	Identified in historical documents during research for the SI UFP-SAP

1.1 Purpose

This Base-wide SI Report is structured so that Sections 1, 2, and 3 provide the Introduction, Facility Background, and the Investigation and Data Evaluation Methodologies, while each investigation area is discussed separately in Sections 4 through 11. Each section presents the site conditions, the completed investigation tasks, the investigation results, and the human health risk screenings (HHRSs) and ecological risk screenings (ERSs) for each respective area.

The principal study questions from the UFP-SAP to be answered by this investigation are:

1. Have previous historical activities at Sites 2, 3, 4, 5, 7, or 9 or AOCs C and D resulted in a release of constituents to the surface soil, subsurface soil, or groundwater?
2. Do the concentrations detected in soil and groundwater suggest potential unacceptable human health or ecological risks?
3. Do media-specific concentrations warrant further investigation or remedial action to meet the Navy's preferred objective of unrestricted land use for the sites?

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Legend

- Road
- Building
- CBD Boundary

N

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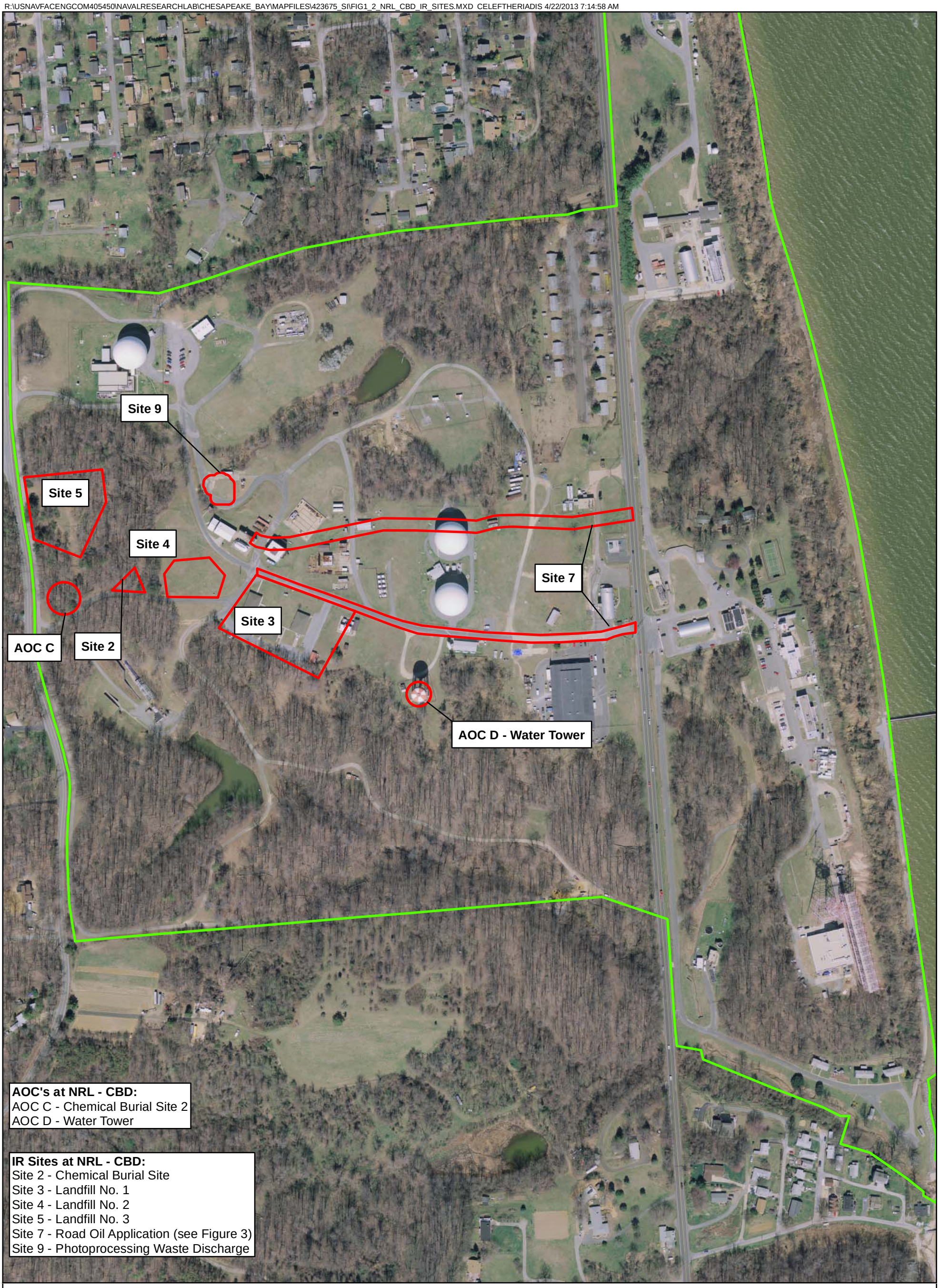
Feet

1 inch = 400 feet

Figure 1-1
NRL-CBD Location Map
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

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Legend

IR Site or AOC Boundary

CBD Boundary

N

0 150 300

Feet

1 inch = 300 feet

Figure 1-2
IR Site and AOC Location Map
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

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SECTION 2

Facility and Site Background

2.1 NRL-CBD Facility Background and History

NRL-CBD is located at 5813 Bayside Road in Calvert County, Maryland, south of the town of Chesapeake Beach, Maryland. NRL-CBD is located approximately 40 miles southeast of Washington, D.C., and occupies approximately 160 acres along the western shoreline of the Chesapeake Bay. The facility is bounded by the Chesapeake Bay to the east and residential housing areas to the north, south, and west. The facility is separated into an eastern and western portion, separated by Bayside Road (Maryland State Route 261).[1]

The mission of NRL-CBD is to provide and maintain facilities for use by the research divisions of the Naval Research Laboratory – Washington, D.C. (NRL-DC), for the testing, development, and evaluation of radar, radio, optical, and fire control equipment, along with other research projects requiring a maritime environment or open skies, but with land-based support facilities (NEESA, 1984).

The original acquisition of land for NRL-CBD was made in 1941, and construction progressed rapidly during World War II. Major expansion occurred in 1953 and 1954 with construction of a large laboratory building, shop facilities, and complete utility systems (NEESA, 1984).

2.2 Facility Geology and Hydrogeology

NRL-CBD is located in the Atlantic Coastal Plain physiographic province. The sediments of the Coastal Plain are a thick sequence of unconsolidated sands, clays, and gravels and, at times, indurated lime or iron-cemented sands (NEESA, 1984). The two primary formations that underlie NRL-CBD are the Choptank formation, which ranges from 75 to 100 feet thick, and the underlying Calvert formation, which is approximately 150 feet thick (NEESA, 1984). Based on information obtained from the soil borings collected at each of the sites that were investigated, the soils underlying NRL-CBD are consistent with the Atlantic Coastal Plain and the Choptank formation. Soils described in the soil borings consisted predominantly of sands and clays.

Groundwater was encountered at three sites, Site 2 (approximately 27 feet below ground surface [bgs]), Site 4 (approximately 16 feet bgs), and Site 9 (approximately 10 feet bgs). In comparison to groundwater elevations obtained from AOC A (CH2M, 2009), it is likely that the groundwater encountered represents the upper portion of the surficial aquifer. While the facility-specific groundwater flow is not known, the overall groundwater flow on the western part of the facility is interpreted to be to the north east following topography based on a previous investigation at AOC A. Groundwater flow at the facility is ultimately east towards the Chesapeake Bay.

2.3 Land Use

NRL-CBD has been in use as a testing and research facility for the Navy since its establishment in 1941. As previously described, the facility consists of laboratory buildings, shop facilities, and other structures that support its mission. All of the sites and AOCs that were investigated during this SI are located on the western portion of the facility and currently and for the foreseeable future, are expected to have an industrial land use.

2.4 Conceptual Site Model

Figures 2-1 and 2-2 graphically present the conceptual site model (CSM) for the sites that were investigated as presented in the UFP-SAP. *It is noted that in the SI phase, the primary objective is not to characterize risk, but instead to determine if there are chemicals that warrant evaluation, or if a site can be eliminated from further evaluation because it can be determined that it does not represent a risk to receptors.* The CSM for each site, as

[1] In addition to the facility at 5813 Bayside Drive, NRL-CBD also operates a boat from a small dock area (referred to as the Navy Dock) located in downtown Chesapeake Beach, Maryland (approximate address 8050 Bayside Road; Latitude = 38°41'30.05" North, Longitude = 76°32'06.00" West). The Navy Dock is approximately 1.7 miles north of the main NRL-CBD facility.

understood leading into the SI investigation, is provided as follows. An updated version of the CSM that incorporates the results of the findings from the SI investigation has been produced and is provided in Section 12.

2.4.1 Potential Source Areas

This section summarizes the potential source areas for each of the sites investigated during the SI. The site history and suspected past disposal practices are discussed in the subsequent sections for each specific site.

Site 2 - From the mid-1950s until the late-1960s, Site 2 was used as an area for chemical burial and/or burning. Based on the history of the site, the likely potential source areas that may be associated with an environmental release are the burial and/or burning pits.

Site 3 - From 1942 until 1950, Site 3 was used as a landfill for municipal, shop, and laboratory wastes. After the landfill closed the site was used for storage. Based on the history of the site, the likely potential source areas that may be associated with an environmental release are the disposal pits and undocumented releases during the time the site was used as a storage area.

Site 4 - From 1950 until 1958, Site 4 was used as a landfill for municipal, shop, and laboratory wastes. Based on the history of the site, the likely potential source areas that may be associated with an environmental release are the disposal pits.

Site 5 - From 1958 until 1968, Site 5 was used as a landfill for municipal, shop, and laboratory wastes. After the landfill was closed the site was used for storage. Based on the history of the site, the likely potential source areas that may be associated with an environmental release are the disposal and burn pits. In addition, undocumented releases from the time when the site was used as open storage may serve as a source.

Site 7 - From 1940 until 1952, Site 7 consisted of unpaved roads located on the portion of NRL-CBD located west of Bayside Road. The unpaved roads were treated with waste oils for dust control. Based on the history of the site, the likely sources of site-related constituents are the former oiled roadways, which are documented to have potentially contained polychlorinated biphenyl (PCB)-contaminated oil.

Site 9 - From the late 1950s until 1975, Site 9 contained a photo-processing lab. Based on the history of the site, the likely source area that may be associated with an environmental release is the former drain pipe through which the photo processing wastes were reportedly disposed. The building and drain pipes have been since demolished and removed from the site.

AOC C - During the 1960s, AOC C may have been used as an area of chemical burial and/or burning. The likely potential source areas that may be associated with an environmental release are the former burial and/or burning pits.

AOC D - Lead-based paint associated with routine maintenance of the water tower conducted during the 1950s through 1970s is thought to serve as a potential source for lead that may be found in surface soils at the site.

2.4.2 Transport Pathways

A transport pathway describes the mechanisms whereby site-related constituents, once released by a source, may be transported from a source area to exposure media (such as surface soil) where receptor exposures may occur. The primary mechanism for constituent transport from the potential source areas is:

Infiltration/leaching of constituents from the potential source areas into surface and subsurface soils and/or groundwater

Additional transport pathways may include:

- Overland flow/surficial runoff
- Suspension/deposition of particulates via wind
- Volatilization from soils

2.4.3 Exposure Pathways and Receptors

The human health exposure pathways and receptors are described in Section 3.4.1, while the ecological pathways and receptors are described in Section 3.5.2.2.

LEGEND

- Site Boundary
- Base Boundary
- Flow Direction
- Water Table
- Potential Migration Pathway*

Site 2 - Chemical Burial Site
Site 3 - Landfill No. 1
Site 4 - Landfill No. 2
AOC C - Chemical Burial Site 2

*Infiltration/leaching of constituents from the potential source areas into surface and subsurface soils and/or groundwater.

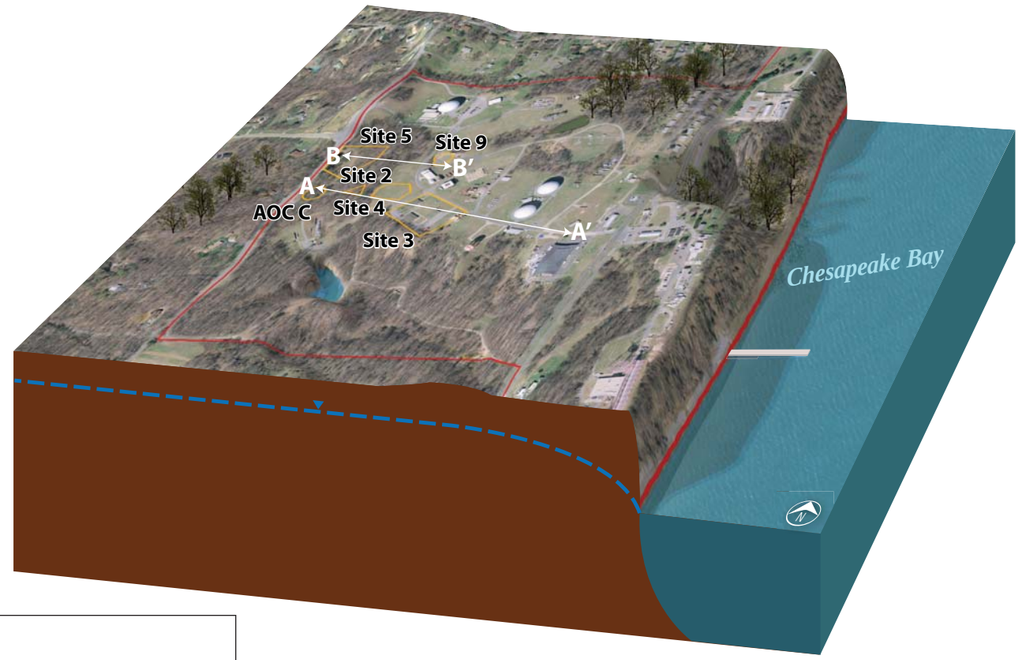
Human Health Exposures and Receptors

Media – Soil

- Current adult/adolescent trespassers and visitors, and adult industrial workers exposed to surface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.
- Future adult/adolescent trespassers and visitors, adult industrial workers, adult and child residents, and construction workers exposed to surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.

Media - Groundwater

- Current and future adult industrial workers as well as future adult and child residents exposed to shallow groundwater through vapor intrusion from the groundwater into indoor building air at any of the sites with buildings, or buildings downgradient of the site.
- Future construction workers exposed to shallow groundwater through dermal contact and inhalation of volatile emissions in an open excavation, if shallow groundwater is within 15 feet of the ground surface.
- Future residents or industrial workers who use the water as a potable water supply. Future residents receptors could be exposed to the groundwater through ingestion, and dermal contact and inhalation of volatile emissions while showering. Future industrial workers could be exposed to the groundwater through ingestion.



Ecological

Wooded

- Features: Edge, densely wooded cover
- Receptors: Soil invertebrates, terrestrial plants, ground foraging (mourning dove) and predatory (owl) birds, and small mammals (mouse, shrew)

Ecological

Open Field

- Features: Short-grassed, open areas between woods and developed areas
- Receptors: Soil invertebrates, terrestrial plants, ground foraging (robin) and predatory (hawk) birds, and small mammals (mouse, shrew)

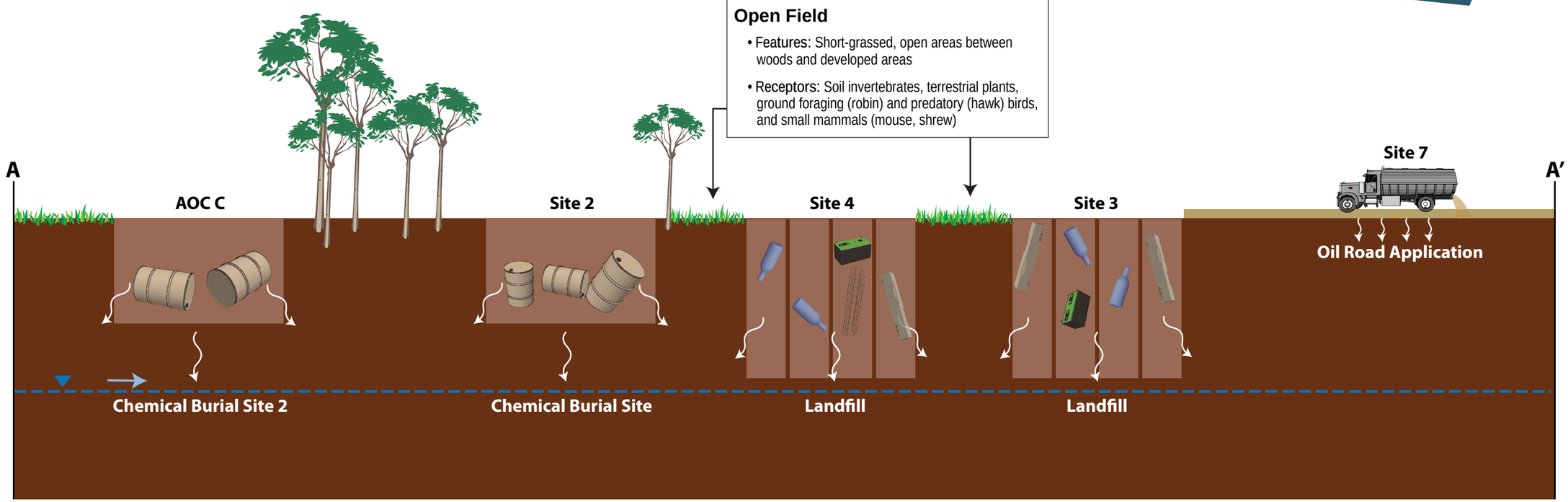


FIGURE 2-1
Conceptual Site Model
Base-Wide Site Inspection Report
Naval Research Laboratory - Chesapeake Bay Detachment (NRL-CBD)
Chesapeake Beach, Maryland

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LEGEND

- Site Boundary
- Base Boundary
- Flow Direction
- Water Table
- Potential Migration Pathway*
- Site 5 - Landfill No. 3
- Site 9 - Photoprocessing Waste Discharge

*Infiltration/leaching of constituents from the potential source areas into surface and subsurface soils and/or groundwater.

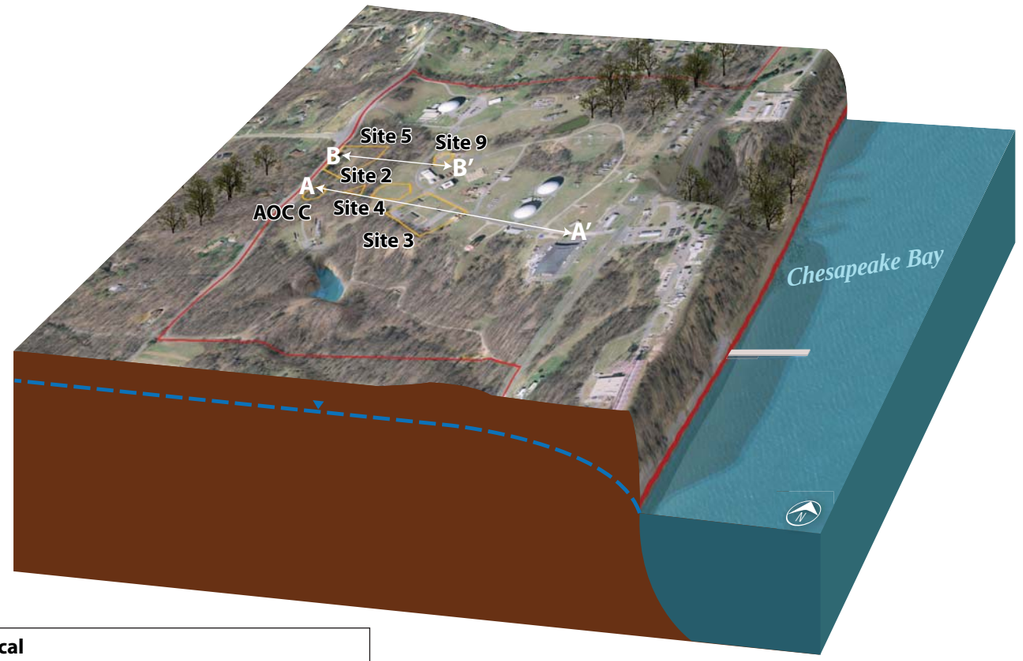
Human Health Exposures and Receptors

Media – Soil

- Current adult/adolescent trespassers and visitors, and adult industrial workers exposed to surface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.
- Future adult/adolescent trespassers and visitors, adult industrial workers, adult and child residents, and construction workers exposed to surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.

Media - Groundwater

- Current and future adult industrial workers as well as future adult and child residents exposed to shallow groundwater through vapor intrusion from the groundwater into indoor building air at any of the sites with buildings, or buildings downgradient of the site.
- Future construction workers exposed to shallow groundwater through dermal contact and inhalation of volatile emissions in an open excavation, if shallow groundwater is within 15 feet of the ground surface.
- Future residents or industrial workers who use the water as a potable water supply. Future residents receptors could be exposed to the groundwater through ingestion, and dermal contact and inhalation of volatile emissions while showering. Future industrial workers could be exposed to the groundwater through ingestion.



Ecological

Wooded

- Features: Edge, densely wooded cover
- Receptors: Soil invertebrates, terrestrial plants, ground foraging (mourning dove) and predatory (owl) birds, and small mammals (mouse, shrew)

Ecological

Open Field

- Features: Short-grassed, open areas between woods and developed areas
- Receptors: Soil invertaebrates, terrestrial plants, ground foraging (robin) and predatory (hawk) birds, and small mammals (mouse, shrew)

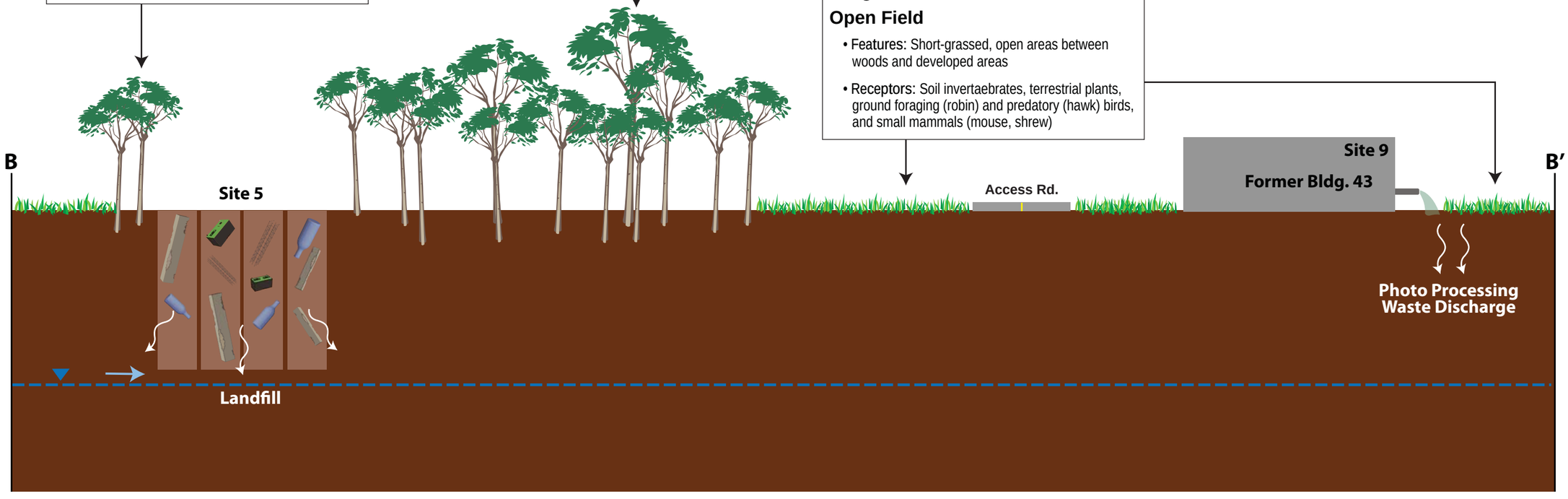


FIGURE 2-2
Conceptual Site Model
Base-Wide Site Inspection Report
Naval Research Laboratory - Chesapeake Bay Detachment (NRL-CBD)
Chesapeake Beach, Maryland

CH2MHILL

SECTION 3

Investigation and Data Evaluation Methodology

This section provides summaries of the overall field investigation, analytical methods, and data evaluation along with an overview of the risk screening approach, methods, and calculations. Site-specific descriptions of the field investigation, data evaluation, and risk screenings are presented in Sections 4 through 11.

3.1 Investigation Methods

The SI investigation utilized a phased data evaluation approach. Field data that were collected (consisting of digital geophysical mapping [DGM] and test pitting) were evaluated to determine the direct-push technology (DPT) sampling locations for the collection of analytical samples. The phased approach was used for Sites 2, 3, 4, and 5 and AOC C where land-filling practices were reported to have occurred, but the details of which could not be confirmed. For sites where historical land-filling practices were not suspected (Sites 7 and 9 and AOC D), pre-determined sampling locations were selected to provide spatial coverage of each site. Investigation activities were performed in accordance with the UFP-SAP; deviations from the UFP-SAP methodology are provided in Sections 4 through 11.

3.1.1 Digital Geophysical Mapping

CH2M subcontracted NAEVA Geophysics (NAEVA) to perform a geophysical survey at five individual investigation areas at NRL-CBD: Site 2, Site 3, Site 4, Site 5, and AOC C. Field work was conducted on September 27, 2012. The geophysical survey was conducted using the Geonics, Ltd., EM31 (EM31) conductivity meter operated in the vertical dipole mode. The objectives of the geophysical survey were to conduct a reconnaissance-level evaluation of whether waste was potentially buried at each site and to provide guidance in the placement of follow-up intrusive investigation locations (test pits).

In vertical dipole orientation, the EM31 has an effective survey depth of approximately 20 feet, although depth of detection with the instrument ultimately depends on the size, depth, and composition of the subsurface materials, as well as site-specific geologic and groundwater conditions. In the vertical dipole orientation, small surface or near-surface (upper 1 foot) features may not be detected by the EM31 due to the fact that in this orientation, the majority of the instrument's response comes from depth. Therefore, this mode of operation is well suited for investigations where little is known about the disposal practices at a site and where potentially deep waste may be buried. No information was available on the types, composition, or depth of potential waste that may be buried at the investigation areas.

Conductivity and inphase component data were recorded with the EM31 in order to provide added confidence in successfully detecting metallic and non-metallic waste. Data were collected along transects with a nominal spacing of 25 feet across each of the five investigation areas. The limited available historical information on waste disposal practices at NRL-CBD indicated that waste was likely disposed of in unlined pits with approximate dimensions of 25 feet by 25 feet. Therefore, the transect spacing was intended to facilitate detection of these potential pits. Additional biased transects were added to investigations areas where suspected disposal areas were identified on historical site plans.

Additional details on the transect locations, geophysical results, methodology, instruments, and survey execution are provided in the NAEVA final report in Appendix A.

CH2M subcontracted ECLS, Inc., a Maryland-licensed professional land surveyor (PLS), to physically mark the transect locations in the field. EM31 data positioning along the transects was accomplished using fiducials at the wooded sites and real-time kinematic global positioning system (GPS) at sites that were relatively open and conducive to the reliable use of GPS. Fiducial positioning utilizes digital tags inserted in the data by the operator as the instrument passes over each stake placed by the PLS. During data analysis, the along-transect positions are translated to Easting and Northing values in the project coordinate system using the coordinates provided by the PLS for each stake.

Interpreted background conditions in the EM31 conductivity and inphase response data are depicted by the green color-filled contours in Appendix A, Figures 1 through 10. The range of values corresponding to background conditions is typically indicative of ambient site-specific geologic and groundwater conditions. During data analysis, the background levels are evaluated by reviewing EM31 static tests performed as part of the data acquisition quality control (QC) process in conjunction with the responses recorded at each individual investigation area. The static tests are conducted at onsite locations that appear to be relatively free of sources of interference (such as underground utilities, buildings, and parked cars). Additional details on the data analysis procedures, field QC processes, and the results of the QC tests are presented in the NAEVA final report (Appendix A).

Selection of test pit locations was done on a site-by-site basis. In general, conductivity anomalies may be the result of buried metal but may also be the result of disturbed soils, localized changes in depth to groundwater, groundwater chemistry, or changes in soil type or geology. Inphase anomalies indicate the presence of metal; therefore, a review of both component data is necessary to evaluate whether anomalies are indicative of metallic or non-metallic features. In general, buried metal would most likely be detected in both the conductivity and inphase component data. It is possible that metallic objects may be more subtly pronounced in the conductivity data compared to the inphase data, but nonetheless, the presence of metal is expected to produce a detectable anomaly in both EM31 response components.

Cultural features at the surface impact EM31 surveys. Therefore, consideration of existing site conditions at the time of the survey is important to understanding the survey results. Buildings, roads, parked cars, underground and overhead utilities and reinforced concrete serve as common sources of interference in EM31 surveys conducted at developed sites. These sources of interference may impact both conductivity and inphase responses.

3.1.2 Test Pitting

Test pits were dug to confirm the presence of suspected waste materials based upon the interpreted results of the geophysical investigation. Test pitting was performed by Ground Zero Field Services using a standard bucket backhoe. The test pit locations were determined as described in the previous section. Test pit locations were generally 10 to 11 feet in length, 5 to 6 feet wide, and dug to a maximum depth of 10 feet or when continuous waste material was encountered, whichever occurred first. In an attempt to confirm the historical description from the *IAS* that continuous waste materials were placed from depths of 4 to 20 feet bgs; once waste material was encountered the test pits were extended a few feet to confirm that continuous waste had been encountered. If waste material was not continuous, then the test pit was extended until continuous waste was encountered or until the maximum depth of 10 feet occurred. When continuous waste was encountered, the test pit was terminated as the test pits were only used to confirm the DGM results and confirm the presence of waste. The material excavated from the test pit was segregated into cover material and waste material (if present) and temporarily stockpiled adjacent to the test pit. The test pit sidewalls were then observed by the CH2M onsite geologist to record soil conditions, waste materials, and other physical characteristics of the test pit. The test pits were then backfilled with the previously excavated material, first with waste material and then with the cover material. The surfaces of the test pits were restored to approximately the original grade and reseeded with grass and straw covering.

DPT sampling locations were selected based upon the results of the test pitting activities and whether waste materials were identified in the subsurface. If waste materials were not identified during the test pitting activities the DPT sampling locations were spatially distributed across the site. If waste materials were identified during the test pit activities, then the DPT sampling locations were focused around those areas to provide the most conservative approach for selecting analytical samples.

3.1.3 Direct-push Technology Methods

Soil cores were collected prior to analytical sampling from each of the DPT locations. The soil cores were retrieved in 5-foot intervals, and the stratigraphy, as well as field observations (such as soil staining,

photoionization [PID] results, and olfactory observations), were recorded by the CH2M onsite geologist. The soil boring logs are provided in Appendix C.

3.1.4 Soil Sampling

Soil samples selected for laboratory analysis were collected from disposable acetate liners and placed in the appropriate sample container for analysis by an offsite laboratory subcontracted to CH2M (Tri Matrix Laboratories). The general approach for sample selection was as follows:

- If evidence of contamination was observed in the soil, based on field observations, the depth interval corresponding to the potential contamination was selected for laboratory analysis.
- If field observations could not discern a depth interval with potential contamination then analytical samples were collected from the maximum depth, as outlined in the UFP-SAP, based on the historical information provided for each site.
- At sites where potential land filling may have occurred; if the DGM and test pitting results confirmed the presence of a burial and/or burning pit then an additional surface soil sample was collected from the area located within the footprint of the burial and/or burning pit.

3.1.5 Groundwater Sampling

Groundwater samples were collected through the use of temporary pre-packed monitoring wells. The pre-packed monitoring wells were installed to a depth where groundwater was encountered and allowed to equilibrate. The groundwater samples were collected through the use of a peristaltic pump. Prior to sample collection, the groundwater was purged to minimize turbidity and then collected in the appropriate sample container. As with the soil samples, groundwater samples were sent to the offsite laboratory for analysis.

3.2 Analytical Methods

Soil and groundwater samples were analyzed in accordance with Section 2.9.4 of the UFP-SAP (CH2M, 2012). Surface soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), PCBs, metals (target analyte list metals, cyanide, and hexavalent chromium), wet chemistry parameters (pH and total organic carbon [TOC]), and grain size. Subsurface soil samples were analyzed for VOCs, SVOCs, PCBs, and metals. Groundwater samples were analyzed for VOCs, SVOCs, PCBs, metals, and filtered metals.

3.3 Data Validation Summary

VOCs, SVOCs, PCBs, metals, and filtered metals data underwent analytical data validation according to United States Environmental Protection Agency (USEPA) Region III procedures. Although not subject to analytical data validation according to USEPA Region III procedures, the wet chemistry and grain-size data were subject to the data verification and validation procedures specified in the UFP-SAP.

3.3.1 Data Qualifiers

Only one result per analyte per sample is presented. If a sample was re-extracted, re-analyzed, or diluted, it was reported twice or more by the laboratory. The result with the highest data quality was selected for reporting and any other results were excluded to prevent redundancy. Such exclusion does not negatively affect data quality. The following data validation qualifiers were used during the validation process:

Qualifier	Meaning	Description	Percent of Total	Number of Results
U	Non-detect	Analyte was not detected. The reporting limit is presented.	74.19	12,404
[none]	Detected	Result is usable at the concentration reported.	13.19	2205
J	Estimated	Analyte is present; the result is estimated because it is below the quantitation limit or because of an associated QC exceedance. The result may be inaccurate or imprecise.	4.89	818
B	Blank contamination	The analyte was not detected at significantly greater than that in associated laboratory or field blanks.	4.78	799
UL	Non-detect, quantitation limit biased low	Analyte was not detected. The reporting limit is probably higher.	1.37	229
UJ	Non-detect, estimated quantitation limit	Analyte was not detected. The reporting limit may be inaccurate or imprecise.	1.02	171
R	Rejected	Result was rejected and is not available for use.	0.26	43
L	Biased low	Analyte is present; the reported value is estimated and may be biased low.	0.18	31
K	Biased high	Analyte is present; the reported value is estimated and may be biased high.	0.11	18

3.3.2 Data Quality Assessment Summary

The samples were collected as specified in the UFP-SAP. The laboratory analyzed the samples in accordance with the SW-846 and American Society for Testing and Materials methods as stated in the UFP-SAP. The data packages were reviewed by a data validator on the basis of the criteria outlined by *Region III Modifications to National Functional Guidelines for Organic Data Review Multi-Media, Multi-Concentration* (USEPA, 1994), *Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis* (USEPA, 1993), *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA450/R-99/008) (USEPA, 1999), and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 540-R-04-004) (USEPA, 2004b).

The laboratory U-qualified 74.19 percent of the results as non-detect and further qualification was not warranted. Another 13.19 percent was reported as detected and further qualification was not warranted. When this is considered, 87.38 percent of the data are acceptable as reported by the laboratory. Of the total results, 4.89 percent were J-qualified as "estimated." Many of these J-qualifiers (86.19 percent of the J-qualified data) are present because the result was detected at less than the limit of quantitation. Results J-qualified for this reason are also usable as reported. Therefore, a total of 91.30 percent of the data reported by the laboratory as detections, non-detects, and estimated detects were not further qualified by data validation and are considered usable as reported. The remaining J-qualifiers resulted from high or low recovery in the continuing calibration, bad linearity or curve function in the initial calibration, high or low internal standard recovery, matrix spike and matrix spike duplicates precision exceedances, field duplicate precision exceedances, and blank contamination.

B-qualifiers amounted to 4.78 percent and resulted from contamination in related equipment and field, trip, method, and continuing calibration blanks. The B-qualifiers indicate that the results may be attributable to field or laboratory blank contamination. The B-qualified results are considered usable as non-detects by risk assessors for evaluating the nature and extent of contamination and estimating potentially associated human health and ecological risks.

L-qualifiers amounted to 0.18 percent and resulted from low matrix spike recovery exceedances. UL-qualifiers amounted to 1.37 percent and resulted from low matrix spike recovery exceedances. The L- and UL-qualifiers indicate that the results or reporting limits are estimated and biased low. This may indicate the presence of a QC problem, but not a problem severe enough to warrant rejection of data. The L-qualified results are considered

usable as detects and UL-qualified reporting limits are considered usable as non-detects by risk assessors for evaluating the nature and extent of contamination and estimating potentially associated human health and ecological risks.

UJ-qualifiers amounted to 1.02 percent and resulted from low matrix spike recovery exceedances. The J-qualifiers, previously discussed, and UJ-qualifiers indicate that the results or reporting limits are estimated. This may or may not indicate the presence of a QC problem, but not a problem severe enough to warrant rejection of data. These results and reporting limits are considered usable by risk assessors as detects and non-detects, respectively, for evaluating the nature and extent of contamination and estimating potentially associated human health and ecological risks.

0.26 percent of the analytical results were rejected (R-qualified) due to unacceptable low recovery limits in the laboratory control samples associated with certain analytical concentrations for benzaldehyde and holding time exceedances of certain hexavalent chromium samples. These results are not available for use for any purpose.

Because all qualified results, with the exception of R-qualified results, are usable as qualified, 99.74 percent of the data are complete and usable as qualified. The overall conclusion is that the dataset generated is acceptable and appropriate for its intended use.

3.4 Human Health Risk Screening Approach

A conservative HHRS was performed to determine the potential for unacceptable human health risks associated with exposure to site media (surface soil, subsurface soil, and groundwater) at Sites 2, 3, 4, 5, 7, and 9 and AOCs C and D. The results of the HHRS provide an initial indication of potential risks from exposure to chemicals of potential concern (COPCs) identified for each site, and are used to help determine whether the sites require further investigation (such as a baseline risk assessment or additional data collection) or future unrestricted (for example, residential) use of the site is acceptable based on human health risks.

3.4.1 Potentially Complete Exposure Pathways

The human health CSM presents an overview of site conditions, potential contaminant migration pathways, and exposure pathways to potential receptors. The CSM is presented in Section 2.4, while graphical representations of the CSM were presented in the SAP (Figures 4.a through 4.c) (CH2M, 2012). The facility background and history is presented in Section 2.1 and land use is presented in Section 2.3. A description of each site and AOC is provided in Sections 4.1 through 11.1.

The potential source areas for each of the sites and AOCs are discussed in Section 2.4. The primary release and transport mechanism from the potential source areas for each site and AOC is infiltration and leaching of constituents from the potential source areas into surface and subsurface soils and/or groundwater. Additional release and transport pathways may include overland flow and surficial runoff, suspension and deposition of particulates via wind, and volatilization from soils and groundwater.

Access to NRL-CBD is restricted; however, once on the facility humans can be exposed to soil and groundwater at the individual sites. Current receptors may include adult and adolescent trespassers and visitors, as well as adult industrial workers exposed to surface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions. Current receptors could also be exposed to shallow groundwater through vapor intrusion from the groundwater into indoor building air at any of the sites with buildings, or buildings downgradient of the site. However, for the sites where groundwater was collected, volatile constituents were not detected in groundwater or are insufficiently volatile (Sites 2 and 4) or there are no occupied buildings onsite or 100 feet downgradient of the site (Site 9). Therefore, the vapor intrusion pathway is incomplete.

Future receptors include the current receptors. In addition, although there are no plans for redevelopment at NRL-CBD, the future receptors also include future residents and construction workers. Future receptors could be exposed to the surface and subsurface soil if future development activities occur at the site (for example, construction of residential housing or industrial buildings) or if piping or excavation work results in exposing subsurface soil. Exposure routes for future exposure to surface and subsurface soil are the same as those for

current exposure to surface soil. Although shallow groundwater is not used as a water supply at the facility, as a conservative approach to evaluate potential future risks it is assumed that shallow groundwater beneath the sites could be used as a future water supply source. Potential future receptors for shallow groundwater could include future residents or industrial workers who might use the water as a potable water supply. Residents could be exposed to the groundwater through incidental ingestion, dermal contact, and inhalation of volatile emissions while showering. Industrial workers could be exposed to the groundwater through ingestion. Additionally, if shallow groundwater is within 15 feet of the ground surface, future construction workers could be exposed through dermal contact and inhalation of volatile emissions in an open excavation. Future receptors could also be exposed to shallow groundwater through vapor intrusion from the groundwater into indoor building air at any of the sites with buildings, or buildings downgradient of the site.

3.4.2 Human Health Risk Screening Methodology

The HHRS was conducted in three steps using a risk-ratio technique (Navy, 2000). The three-step screening process is described in the following sections.

Soil and groundwater samples collected from Sites 2, 3, 4, 5, 7, and 9 and AOCs C and D in October 2012 were evaluated in the HHRS. The analytical data for the samples evaluated in the risk screening are presented in Appendix D. The data included in the HHRS were validated as described in the previous section. The data were evaluated to determine their reliability for use in the HHRS. A review of the data identified the following criteria for data usability:

Data qualified with an R (rejected) were not used in the HHRS.
Data qualified with a B (blank contamination) were treated as non-detected concentrations.
Values flagged with a J, L, or K were treated as detected concentrations.

For duplicate samples, the maximum concentration between the two samples was used as the sample concentration. If the analyte was only detected in one of the samples, the detected concentration was used as the sample concentration. If the analyte was not detected in either of the samples, the higher detection limit was used as the sample detection limit.

3.4.3 Step 1: Comparison to Screening Levels

The maximum detected constituent concentrations for surface soil, subsurface soil, and groundwater were compared to the USEPA human health regional screening levels (RSLs) (USEPA 2015). RSLs based on noncarcinogenic effects were based on a hazard quotient (HQ) of 0.1 to account for exposure to multiple constituents. RSLs based on carcinogenic endpoints were based on a carcinogenic risk of 1×10^{-6}. Soil data were also compared to site-specific background values [95% Upper Tolerance Limits (UTLs)] for metals concentrations (Tetra Tech, 2015); however, background concentrations for groundwater were not available.

Surface soil and subsurface soil data were compared to residential soil RSLs and site-specific background 95% UTL concentrations (Tetra Tech, 2015). Although industrial workers are the most likely receptors at the sites, trespassers and visitors (adult and youth) are also potential receptors, in addition to hypothetical future residential receptors. Residential soil RSLs are more conservative (that is, lower) than industrial soil RSLs and are therefore protective of all potential receptors (such as trespassers, visitors, residents, industrial workers, and construction workers). If the maximum detected concentration was greater than the residential soil RSL and background 95% UTL concentration, the constituent was carried forward to Step 2.

Groundwater data were compared to tap water RSLs. An exceedance of the criteria was used to identify the groundwater COPCs, which were then carried forward to Step 2. Filtered and unfiltered groundwater samples were collected for metals analysis. Following current USEPA risk assessment guidance (USEPA, 2014), the unfiltered groundwater samples were evaluated in the HHRS. The maximum contaminant levels (USEPA, 2011) were also presented in the comparison table. However, these values are provided for informational purposes only and were not used to identify COPCs.

Lead is not evaluated in the same manner as the other COPCs, but is regulated by USEPA based on blood-lead uptake using a physiologically based pharmacokinetic model called the Integrated Exposure Uptake Biokinetic Model. As a screening tool, lead is screened at 400 milligrams per kilogram (mg/kg) in soil based on residential exposure. If the maximum lead concentration is greater than 400 mg/kg, it is retained as a COPC for the site or AOC. For groundwater, lead is screened against the federal action level of 15 micrograms per liter (µg/L) (USEPA, 2011). If the maximum lead concentrations are greater than the action level, it is retained as a COPC for the site or AOC.

If a chemical was 100 percent non-detected in a medium, it was not selected as a COPC. Although non-detected chemicals were not selected as COPCs, sample-specific detection limits (that is, adjusted method detection limits) were compared to screening levels.

3.4.4 Step 2: Risk Ratio Evaluation using Maximum Detected Concentrations

For constituents identified as COPCs in Step 1, a corresponding risk level was calculated using the following equation:

$$\text{corresponding risk level} = \frac{\text{concentration x acceptable risk level}}{\text{RSL}}$$

The concentration is the maximum detected concentration (the same concentration that was used in Step 1). The acceptable risk level is 1 for noncarcinogens and 10^{-6} for carcinogens. The RSL is the residential soil RSL based on a HQ of 1 for soil or the tap water RSL based on a HQ of 1 for groundwater (USEPA, 2015). All of the corresponding risk levels for each constituent within a media are summed to calculate the cumulative corresponding hazard index (HI) (for noncarcinogens) and cumulative corresponding carcinogenic risk (for carcinogens). A cumulative corresponding HI is also calculated for each target organ and effect. For Step 1 COPCs that elicit both noncarcinogenic and carcinogenic effects, a corresponding risk level is calculated for both endpoints using the RSL based on noncarcinogenic effects and the RSL based on carcinogenic endpoints for that constituent.

If the cumulative corresponding HI for a target organ or effect is greater than the risk-ratio screening benchmark of 0.5, or the cumulative corresponding carcinogenic risk is greater than 5×10^{-5}, the constituents contributing to these values are retained as COPCs and further evaluated in Step 3.

The MDE uses an acceptable carcinogenic risk range of 1×10^{-6} to 1×10^{-5}, which is a smaller range of acceptable risk than specified by the National Oil and Hazardous Substances Pollution Contingency Plan (1×10^{-6} to 1×10^{-4}) and is lower than the target risk ratio carcinogenic risk of $5x10^{-5}$ specified in the Navy guidance (Navy, 2000), and an acceptable cumulative noncarcinogenic hazard of 1. If the cumulative corresponding HI for a target organ or effect is greater than the MDE-acceptable HI of 1 or the cumulative corresponding carcinogenic risk is greater than the MDE-acceptable carcinogenic risk of 1×10^{-5}, the constituent will be retained as an MDE COPC and further evaluated. Due to the differences in the acceptable risk levels used by the Navy versus the MDE, the HHRS results are presented in this report to reflect the acceptable risk levels used by both the Navy and MDE.

3.4.5 Step 3: Risk Ratio Evaluation using 95 percent Upper Confidence Limit on Mean

For constituents identified as COPCs in Step 2, a corresponding risk level was calculated, as previously discussed, for Step 2. However, the 95 percent upper confidence limit (UCL) of the arithmetic mean was used in place of the maximum detected concentration to obtain a more site-specific risk ratio for data sets containing five or more samples. The 95 percent UCL of the arithmetic mean of the data set was calculated using USEPA's ProUCL statistical software program (USEPA, 2015). If the cumulative corresponding HI by target organ/effect is greater than the risk-ratio screening benchmark of 0.5, or the cumulative corresponding carcinogenic risk is greater than the 5×10^{-5} risk-ratio screening benchmark specified in the Navy risk ratio guidance document (Navy, 2000), then constituents contributing to these values are considered COPCs and there is a potential for unacceptable human health risks associated with exposure to the site. Additionally, if the cumulative corresponding HI by target organ and effect is greater than the MDE target HI of 1 or the cumulative corresponding carcinogenic risk is greater than

the MDE target carcinogenic risk of 1 x 10^{-5}, then constituents contributing to these values are considered MDE COPCs and there is a potential for unacceptable human health risks associated with exposure to the site based on MDE target risk levels.

Step 3 was only performed for media with COPCs from Step 2 having five or more samples. Five or more samples are needed to perform the statistical calculations necessary to estimate the Step 3 exposure concentration. The most current version of the ProUCL software program (USEPA, 2013) was used to test the data distribution and calculate 95 percent UCL exposure point concentrations (EPCs) used for the Step 3 risk-ratio calculations. In cases where the recommended UCL exceeded the maximum detected concentration, the maximum concentration was used as the EPC. Step 3 of the risk screening evaluation was not performed for groundwater (Sites 2, 4, and 9) because less than five samples were available and a 95 percent UCL could not be calculated.

3.4.6 General Uncertainties Associated with Human Health Risk Screening Evaluation

The uncertainty associated with the data analysis is minimal, as the data have been fully validated prior to use in the risk assessment.

The uncertainty related to the selection of COPCs has been addressed by using conservative assumptions when applicable. The general assumptions used in the COPC selection process were conservative to ensure that actual COPCs were not eliminated from the quantitative risk assessment and that the highest possible risk was estimated. RSLs based on residential assumptions were used to select the COPCs for all of the scenarios, including non-residential scenarios.

Site soil data were compared to site-specific background levels (Tetra Tech, 2015) to determine whether concentrations in soil at the site are consistent with concentrations in unimpacted site soils. Aluminum, arsenic, cobalt, iron, manganese, and thallium were detected in soil at some of the sites at concentrations below the site-specific background levels, and were therefore not retained as COPCs for these site. A comparison of site groundwater concentrations was not used to select COPCs for groundwater, as no background or MDE anticipated typical concentrations (MDE, 2008) are available. Therefore, some of the constituents that have been identified as groundwater COPCs and carried through the HHRS may be present at concentrations consistent with background conditions. This may result in including groundwater risks in the total site risk that may be associated with background conditions and are not necessarily site-related.

To conservatively evaluate unrestricted land use, it was assumed that the sites may be used for residential purposes in the future; however, this is not a likely scenario. It is also not likely that groundwater from the sites and AOCs will be used as a future potable water supply.

3.5 Ecological Risk Assessment Approach

3.5.1 Introduction

This section summarizes the ecological risk assessment (ERA) component of the SI for the NRL-CBD. The SI was conducted in accordance with Navy policy for ERAs (CNO, 1999), with Navy guidance for implementing this ERA policy (NAVFAC, 2001), and with USEPA ERA Guidance for Superfund (USEPA, 1997).

The objectives of the ERA are to:

- Describe the environmental setting at the sites with an emphasis on ecological receptors
- Refine the ecological CSM for exposure pathways for ecological receptors
- Determine the presence of site-related constituents detected in environmental media at the site as a result of historical site activities.

Identify contaminants that exist as a result of historical site operations and that may require further investigation

Results of the ERA will be used to determine whether contaminants are present in site media due to historical site operations that could represent a potential risk to environmental receptors and if additional evaluation of potential risks is needed to further characterize these sites based on potential ecological risk.

This ERA was conducted with chemical analytical data collected during the SI conducted in October 2012 as described in *Final Tier II Sampling and Analysis Plan Base-Wide Site Inspection, Naval Research Laboratory-Chesapeake Bay Detachment, Chesapeake Beach, Maryland* (CH2M, 2012). The ERA focused on the evaluation of chemical analytical data for surface soil because, as discussed in Section 3.5.2, this is the only media to which potential ecological receptors could be exposed to chemicals at the sites.

The ecological risk assessment is comprised of the following sections:

Section 3.5.2—Screening-level Problem Formulation. Provides an overview of the site activities, setting, and the habitats; further develops the CSM; and identifies receptor groups for screening in the SI.

Section 3.5.3—Screening-level Assessment. Establishes chemical exposure levels (screening values) for the potential ecological receptors identified for screening**.** Identifies the analytical chemistry data evaluated in the ERA, data groupings, and exposure models used to estimate the potential exposure of ecological receptors to site-related chemicals.

Section 3.5.4 – Screening-level Risk Calculation. Compares estimated exposure concentrations with screening values to derive screening-level risk estimates to identify COPCs. Evaluates the site site-relatedness of chemicals, based on a comparison to background concentrations and discusses uncertainties associated with the risk calculation.

Results of the ERA screening are presented within each of the site-specific sections (Sections 4 through 11), with a final summary of the evaluation and recommendations presented in Section 12.

3.5.2 Screening-level Problem Formulation

The products of the screening-level problem formulation are the preliminary CSM and the assessment and measurement endpoints. The purpose of the CSM is to describe how ecological receptors may be exposed to chemical constituents originating from sites. Development of the CSM requires identifying and describing major habitats and ecological receptors, media of potential concern, and potential contaminant sources. This information is used along with an understanding of how chemicals move through the environment (transport and exposure pathways) to build the CSM. Potentially complete exposure pathways and receptors are identified as part of the CSM.

Although the objective of the CSM is to discuss each potential exposure pathways to site receptors, the focus of the SI evaluation is on initially determining whether there are chemicals that are site-related that could represent a potential risk to ecological receptors. Accordingly, this CSM for the SI focuses on screening these chemicals against conservative ecological screening values (ESVs) that are protective to a wide range of potential ecological receptors, rather than focusing the specific species identified as representing complete exposure pathways in the CSM.

The screening-level problem formulation is broken into two sections. Section 3.5.2.1 presents information pertaining to the environmental setting and onsite habitats and biota being assessed. An overview of the facility, sites and surrounding land use is described in Section 2. Section 3.5.2.2 expands upon the preliminary CSM presented in Section 2.4, discussing the pathways and routes by which ecological receptors could be exposed to chemicals.

Environmental Setting

The areas being evaluated during the SI are composed of two distinctly different habitat types. Sites 2 and 5 and AOC C are composed of wooded habitat, while Sites 3, 4, 7, and 9 and AOC D are composed of primarily mowed mixed grass habitats that are bordered by wooded habitat on one or more sides. The wooded areas are covered by mostly mature upland forest with little scrub shrub understory. The trees in the wooded areas are primarily

deciduous, with some scattered stands of evergreen trees. Trees within Sites 3, 4, and 9 were removed as part of historical site activities. These areas occur within the developed portions of the sites and the seeded grasses in these areas are regularly mowed as part of site maintenance activities. Site 7 encompasses the areas bordering the roadways, and habitats within these areas are also composed of mostly mowed mixed grass communities. The wooded onsite habitats are expected to support a variety of both lower-trophic-level terrestrial invertebrate species (such as earthworms) and upper-trophic-level birds and mammals typical of eastern deciduous woodland habitats. The mowed mixed grass communities are also expected to support lower-trophic-level terrestrial invertebrates, but are expected to support a more limited range of mostly urban-adapted wildlife species that typically use mowed lawn habitats, such as eastern gray squirrels and American robin.

A literature-based search for federally listed endangered, threatened, or other species of special concern was conducted for Calvert County through the Chesapeake Bay Field Office of the United States Fish and Wildlife Service (USFWS, 2013). The Sensitive Joint Vetch (*Aeschynomene virginica*), which has a Federally Threatened status, was identified as potentially present in Calvert County. However, it is not known if this species is present on the facility. The Puritan Tiger Beetle (*Cicindela puritana*) and Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*) were identified as a Federally Threatened species, but would be localized to the beach cliffs.

Ecological Exposure Pathways and Receptors

Based on the woodland and mowed mixed grass communities present on the areas being evaluated, there are potentially complete exposure pathways for lower-trophic-level terrestrial receptors (primarily terrestrial plants and soil invertebrate communities) and upper-trophic-level birds and mammals typical of eastern deciduous woodland and mowed lawn habitats. Potential exposure pathways for lower-trophic-level receptors primarily consist of direct exposure to chemicals in surface soil. Terrestrial plants also could be exposed to chemicals through roots during water and nutrient uptake. Upper-trophic-level receptors (birds and mammals) could be exposed to chemicals present at the areas identified for investigation via the following potential exposure pathways:

- Incidental ingestion of chemicals from surface soil while foraging or grooming
- Ingestion of chemicals that have accumulated in prey
- Direct (dermal) contact with chemicals in surface soils
- Inhalation of gaseous chemicals or chemicals adhered to suspended particulate matter

Lower-trophic-level species (such as plants and soil invertebrates) are likely to have their greatest exposure through direct contact with contaminated media. Terrestrial wildlife may be exposed to chemicals via the ingestion of chemicals from soil or food while foraging and the dermal absorption of chemicals from soil via direct contact. The relative importance of these exposure routes depends in part on the chemical being evaluated. For chemicals having the potential to bioaccumulate, the greatest exposure to wildlife is likely to be from the ingestion of prey. For chemicals having a limited potential to bioaccumulate, the exposure of wildlife to chemicals is likely to be greatest through the direct ingestion of the contaminated media, such as soil or sediment. Consistent with the scope of an SI, the ERA evaluation will focus only on the initial screening of chemicals based on the direct exposure of lower-trophic-level receptors (terrestrial plants and soil invertebrates). This screening provides a conservative indication of whether there are chemicals in surface soil that could represent a potential for adverse effect and that warrant further evaluation for their potential to represent an ecological risk.

3.5.3 Screening-level Assessment

The following section discusses the approach for conducting the SI ERA. The result of the evaluation itself is presented in each site-specific section. If this ERA indicates no unacceptable potential for adverse effect to ecological receptors, the screening process can be terminated. Chemicals indicating a potential for ecological risk are summarized at the completion of this evaluation and recommendations are made about the need for additional evaluation.

Screening-level Effects Evaluation

The purpose of the screening-level effects evaluation is to establish chemical exposure levels (screening values) that represent conservative thresholds for adverse ecological effects. Screening levels are developed to be protective of selected ecological receptors from direct exposure to chemicals in environmental media, in this case, surface soils.

Media-specific screening values for soil are designed to identify chemical concentrations that are protective of terrestrial plant and soil invertebrate communities. Media-specific screening values for soil were preferentially based upon USEPA Soil Screening Levels (ecological soil screening levels). When media-specific screening values were not available from this preferred source, USEPA Region III Biological Technical Assistance Group Screening Levels (lower of terrestrial invertebrate and plant) or other available alternate toxicological values from the scientific literature were used for screening. The selected surface soil screening values (and their reference source) are provided in Table 1 of Appendix F.

Screening-level Exposure Estimates

The screening-level exposure estimate summarizes the analytical data to be considered for use in the ERA, the data groupings, and the exposure models and input parameters that are used to estimate the potential exposure of ecological receptors to chemicals at each site. Consistent with the objectives of the SI, conservative assumptions were used when estimating the potential for the exposure of ecological receptors to chemicals in the environment.

Available Analytical Data and Data Groupings

The ERA focused on the evaluation of surface soil (0 to 0.5 foot) for each of the evaluated sites. Subsurface soils and soils under paved surfaces were not evaluated in the ERA. Subsurface soils were not evaluated because the exposure of most ecological receptors is expected to be significantly less in deeper soils. Soils beneath paved surfaces were not evaluated because they are considered inaccessible to ecological receptors. All other surface soil data were grouped by site for evaluation.

Exposure Estimation

The following guidelines were used in the SI to estimate the potential direct exposure of ecological receptors to chemicals in soils:

For each data group, the maximum detected chemical concentrations in surface soil were used to conservatively estimate potential direct chemical exposures.

For chemicals not detected in any samples of a data grouping, the maximum method reporting limit was used as the maximum detected chemical concentration to estimate the potential direct exposure.

For samples with duplicate analyses, the higher of the two detected concentrations was used if both values are detects. In cases where one result is a detected concentration and the other a non-detect, the detected value was used for screening.

3.5.4 Screening-level Risk Calculation

The screening-level risk calculation is the final step of the ERA for the SI. In this step, maximum exposure concentrations (abiotic media) are compared to the corresponding screening values to derive screening risk estimates. The outcome of this step is a list of COPCs for each chemical evaluated or the elimination of a chemical from further consideration based on the conclusion that they are unlikely to adversely affect the ecological receptors of concern.

Selection of Chemicals of Potential Concern

COPCs were selected using the HQ method. HQs were calculated by dividing the maximum detected chemical concentration in data grouping being evaluated by the corresponding screening value. Chemicals with HQs greater than or equal to 1.0 are considered COPCs. In the SI ERA, detected chemicals without screening values were also retained as COPCs.

HQs exceeding 1 indicate the potential for risk since the chemical exposure concentration exceeds a toxic threshold represented by the screening value. However, screening values and exposure estimates in the SI are derived using intentionally conservative assumptions such that HQs greater than 1 do not necessarily indicate that risks are present or impacts are occurring. HQs greater than 1 instead identify chemical that may require further evaluation. Following the same reasoning, HQs that are equal to or less than 1 indicate that risks are very unlikely, enabling a conclusion of no unacceptable risk to be reached with a high level of confidence and negating the need for further evaluation of that chemical-pathway-receptor combination.

Constituents without an identified screening value were retained for further analysis. Aluminum (pH less than 5.5) and iron (pH between 5 and 8) were also retained at sites with pH values within the designated ranges. Within the designated range, aluminum and iron are considered bio-available and potentially pose a risk to ecological receptors.

The ERS results for the eight sites are detailed in the ERA summary sections within each site-specific section.

Comparison of Site Chemical Concentrations to Background Concentrations

In addition to comparing chemical concentrations to ESVs, the maximum detected concentrations of the inorganic chemicals detected in surface soil at each site were compared to background concentrations. The 95% UTLs for inorganic constituents in Soil Groups 2 and 3 sites (Tetra Tech, 2015) were used for this comparison. The maximum concentration of inorganic constituents detected at a site was compared to background 95% UTLs to determine if chemicals that were identified as COPCs were also detected at concentrations above background. COPCs that are not present at concentrations exceeding background 95% UTLs were considered to be present at naturally-occurring concentrations and were not recommended for further evaluation in the ERA process.

Uncertainties

Uncertainties are present in all risk assessments because of the limitations in the available data and the need to make assumptions and extrapolations based on incomplete information. However, because conservative assumptions are built into the screening process, the SI evaluation is more likely to overestimate than underestimate risk. The following paragraphs summarize the primary uncertainties associated with this evaluation.

Data Available for Evaluation - The SI ERA was based on a limited number of surface soil samples collected from each site. These samples were in most cases collected from locations where the highest chemical concentrations would be expected to occur based on site observations or information available about historical site activities. In most cases, concentrations are expected to be much lower outside of the immediate and localized area of sampling. Based on the collected samples, however, only concentrations occurring within the areas where the highest concentrations are present were characterized. Based on the bias of collecting samples from locations where chemicals are likely to be present at their highest concentration, risks are likely in most cases to be overestimated by this screening.

Non-detected Chemicals - The current assessment focused on the evaluation of detected chemicals. There is some uncertainty associated with the possible occurrence of non-detected chemicals in soils if the reporting limits of those chemicals also exceed the ESV. Although it cannot be determined definitively that such chemicals do not occur onsite, based on the general bias of samples to potential source areas, it is considered unlikely that chemicals potentially posing a risk to ecological receptors would not have been detected in soil.

Detected Chemicals Without ESVs - Chemicals without ESVs were not identified for additional focused evaluation. There is uncertainty associated with these chemicals as it cannot be determined definitively if they represent a potential risk. The following chemicals were detected but did not have ESVs: 4,6-dinitro-2-methylphenol (Site 4), benzaldehyde (Site 2 and AOC C), carbazole (Sites 4 and 5), dibenzofuran (Sites 4 and 5), isopropylbenzene (Site 9), methyl acetate (Sites 2, 5, and 7), methylcyclohexane (Site 9), m-, o-, and/or p-xylene (Sites 7 and 9 and AOC C) aluminum (Sites 2, 3, 4, 5, 7, 9 and AOC C), and iron (Sites 2, 3, 4, 5, 7, 9 and AOC C). Although there remains some uncertainty, these chemicals are considered unlikely to represent a potential risk to ecological receptors. Isopropylbenzene, methyl acetate, methylcyclohexane, and xylenes are volatile compounds, are

expected to be transient in surface soils, and are considered unlikely to represent a long-term exposure to ecological receptors, unless there is an ongoing source of the compound at the site. Furthermore, most of these compounds were detected in only one or two of the samples and the highly localized presence of these compounds is not likely to represent a risk to ecological receptor populations, which is the focus of an ERA. ESVs are not available for aluminum and iron. Soil pH ranges at which aluminum and iron would be the most bioavailable in soil have been established in USEPA 2003a; however, these values only indicate bioavailability, not toxicity. In order for a chemical to be toxic, it has to be both bioavailable and present at high enough concentrations to cause an adverse effect. As discussed in the site-specific evaluations, aluminum was detected at concentrations exceeding background at three sites (Sites 2, 4, and AOC C), while iron was detected at concentrations exceeding background at two sites (Sites 2 and 4). Aluminum and iron were not detected at concentrations exceeding background and were not recommended for further evaluation at any of the other sites. Although exceeding background, aluminum was not recommended for further evaluation at Sites 2, 4, and AOC C and iron was not recommended for further evaluation at Sites 2 and 4 for the following reasons:

- Waste materials were not encountered in any of the test pits or DPT borings at Sites 2, 4, or AOC C;
- Detected aluminum concentrations only exceed background at a single sample location at Sites 2, 4, and AOC C. Detected concentrations in all other samples remained within background.
- Detected iron concentrations at Site 2 only exceeded background at a single location, while detected iron concentrations at Site 4 (up to 21,000 mg/kg) only marginally exceeded background concentrations (15,000 mg/kg) at two locations. Furthermore, Bodek et al. (1988) indicates that iron concentrations in natural soils frequently range from 20,000 mg/kg to 550,000 mg/kg, which is higher than the range of iron concentrations detected at Sites 2 or 4.

SECTION 4

Site 2 – Chemical Burial Site

4.1 Site Description and Background

Site 2, also known as the Chemical Burial Site, is located on the western portion of the NRL-CBD property (**Figure 4-1**). The extent of the site has not been previously documented prior to the UFP-SAP; however, a historical photograph dated April 1955 shows ground disturbance (clearing) at the site that corresponds to an area of 4,263 square feet (ft^2). Today the site is largely wooded and relatively flat with a maximum elevation of approximately 150 feet above mean sea level (amsl).

The chemical burial site was reportedly used as a disposal and/or burning area for chemical wastes that were generated at the NRL-DC facility and brought to NRL-CBD. The operating dates for this site are not fully documented, as the IAS only presents two disposal events, one in October 1968 and a second event from a period of May to October 1969, in which chemicals were burned and/or disposed of at the site. However, a facility drawing obtained from NRL-CBD dated January 1960 shows an area coinciding with the location of Site 2 labeled as "hazardous area, buried gas cylinders, drums etc." In addition, land disturbance is shown in historical photographs as early as April 1955.

In October 1968, 400 pounds of chemicals were reportedly taken to the site and consisted of benzene, toluene, waste oil, ether, lithium hydride, acetone, alcohol, paint thinner, sulfuric acid, and nitric acid (NEESA, 1984). During the second disposal event that occurred from May to October 1969, wastes composed of 1,200 pounds of unspecified chemicals were taken to the site. This latter disposal event corresponded to a time frame when the chemistry department at NRL-DC was consolidated, and disposal activities during this time period are therefore not characteristic of the normal amounts of chemicals produced in a typical 5-month period at NRL-DC (NEESA, 1984). The IAS reports that memoranda from the Safety Department provided provisions regarding the establishment of burning holes (at least 4 feet deep and 6 ft^2) and methods for igniting the waste material (containers should be soaked with kerosene and gasoline) (NEESA, 1984).

4.2 Investigation Summary

4.2.1 Digital Geophysical Mapping Survey

A DGM survey was completed along four transects located across Site 2. The conductivity results are shown on Figure 3 in Appendix A. The responses represented by the pink colors near the southern survey area boundary are the maximum conductivity values recorded at Site 2 and correspond to values of between approximately 30 and 40 milliSiemens per foot (mS/ft). The responses represented by the orange colors at the northern ends of Transects 30 and 31 correspond to values of between approximately 21 and 25 mS/ft. The lack of corresponding inphase anomalies (Appendix A, Figure 4) indicated that these conductivity anomalies were most likely not associated with buried metal.

A road located within approximately 10 feet of the site extends near the southern boundary of Site 2. It is possible that the maximum conductivity anomalies were associated with the EM31 instrument's proximity to the road. The responses at the northern end of Transect 30 appear to be indicative of a change in soil type or geology or a change in depth to groundwater. Based on the conductivity results, three test pits were advanced at Site 2 in order to evaluate whether non-metallic debris or disturbed soils indicative of potential historical disposal activities were present.

4.2.2 Test Pitting

Three test pit locations were selected at Site 2 (**Figure 4-1**). Two locations were selected on Transect 30 and one on Transect 32. The complete test pit logs are located in Appendix B. A brief summary of the results for each test pit are provided as follows.

Test Pit 1 (Northern end of Transect 30) – The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of sandy silt. No waste materials or soil staining were encountered in this test pit.

Test Pit 2 (Transect 32) - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of sandy silt. No waste materials or soil staining were encountered in this test pit.

Test Pit 3 (Southern end of Transect 32) - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of sandy silt. No waste materials or soil staining were encountered in this test pit.

4.2.3 Soil Sampling

Based on the lack of evidence indicating that chemical burial occurred at the site, five DPT sampling locations (DP01 through DP05) were spatially distributed across the site (**Figure 4-2**). Soil borings were advanced to maximum depth of 30 feet bgs and no signs of waste materials or soil staining were encountered in any of the DPT locations. Soil boring logs for each location are presented in Appendix C. Co-located surface soil and subsurface soil samples were collected from each of the five DPT sampling locations. Surface soil samples were collected from a depth of 0 to 6 inches bgs while subsurface soil samples were collected from a depth ranging from 24 feet to 30 feet bgs. All samples were analyzed in accordance with the UFP-SAP.

4.2.4 Groundwater Sampling

A temporary well, consisting of a 1.5-inch-diameter pre-packed well screen and riser, was installed to 30 feet bgs and screened between 20 and 30 feet bgs at location DP02 and allowed to equilibrate overnight. The following day-one grab groundwater sample was collected using a peristaltic pump. The groundwater sample was collected in accordance with the UFP-SAP. The temporary well was removed and the borehole was abandoned.

4.3 Analytical Results

A summary of the constituents detected in soil and groundwater are presented in **Tables 4-1 and 4-2** respectively. Data tables with the complete analytical results for Site 2 are located in Appendix D. The soil and groundwater analytical data were evaluated with respect to potential human health receptors (Section 4.4) and ecological receptors (Section 4.5). The constituents detected in soil and groundwater at Site 2 are discussed as follows.

4.3.1 Surface Soil Analytical Results

A total of five surface soil samples were collected at Site 2 during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

VOCs – Six VOCs (2-butanone, 2-hexanone, acetone, methyl acetate, styrene, and toluene) were detected in surface soil samples, with at least one VOC (2-butanone) detected in all surface soil sample locations.

SVOCs – Sixteen SVOCs (acenaphthene, anthracene, benzaldehyde, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, butylbenzyphthalate, chrysene, dimethyl phthalate, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene, and pyrene) were detected in surface soil samples. The majority of the detections were found at location DP05.

Pesticides and PCBs – One PCB, Aroclor-1260, was detected at two locations, DP04 and DP05 respectively.

Metals – Twenty-three metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, thallium, vanadium, and zinc) were detected in surface soil samples. Detections were found at all sample locations with the exception of calcium, hexavalent chromium (only one sample collected), mercury, and zinc.

Wet Chemistry (pH and TOC) – pH ranged from 4.9 to 6.8, while TOC ranged from 1,000 mg/kg to 4,200 mg/kg.

4.3.2 Subsurface Soil Analytical Results

A total of five subsurface soil samples were collected at Site 2 during the October 2012 field event. The results of the subsurface soil sampling are summarized as follows.

VOCs – Three VOCs (2-butanone, acetone, and toluene) were detected in subsurface soil samples. The detections were found at three locations (DP01, DP02, and DP03), with each location containing at least one detection.

SVOCs – One SVOC (dimethyl phthalate) was detected in subsurface soil at location DP02.

Pesticides and PCBs – No pesticides or PCBs were detected in subsurface soil.

Metals – Twenty metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, hexavalent chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, thallium, and vanadium) were detected in subsurface soil samples. Detections were found at all sample locations with the exception of hexavalent chromium (only one sample collected), selenium, and silver.

4.3.3 Groundwater Analytical Results

One groundwater sample was collected at Site 2 during the October 2012 field event. The results of the groundwater sampling are summarized as follows.

VOCs – No VOCs were detected in the groundwater sample.

SVOCs – No SVOCs were detected in the groundwater sample.

Pesticides and PCBs – No pesticides or PCBs were detected in the groundwater sample.

Metals – Seventeen total metals (aluminum, antimony, arsenic, barium, cadmium, calcium, chromium, cobalt, iron, magnesium, manganese, nickel, potassium, selenium, sodium, thallium, and vanadium) and 16 dissolved metals (antimony, arsenic, barium, cadmium, calcium, chromium, cobalt, iron, magnesium, manganese, nickel, potassium, sodium, thallium, vanadium, and zinc) were detected in the groundwater sample.

4.4 Human Health Risk Screening Results

The HHRS for Site 2 was conducted in three steps using the risk-ratio technique (Navy, 2000) described in detail in Section 3.4. Results were reported for both the Navy and the MDE target-risk levels. An overview of the various potential receptors and exposure pathways addressed in the HHRS is discussed in Section 3.4.1. The supporting tables for the evaluation are presented in Appendix E.1.

Surface Soil

The risk-based screening and risk-ratio evaluation for surface soil at Site 2 is provided in Appendix E.1, Tables 2.1 and 2.1a.

Step 1: One constituent was identified as a COPC: hexavalent chromium.

Step 2: Cumulative cancer risk of 8×10^{-6}; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the MDE target risk level. The HI for hexavalent chromium is less than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. No constituents were identified as COPCs.

No screening criteria were available for dimethyl phthalate. Therefore, potential risks could not be evaluated for this constituent.

Of the constituents that were 100 percent non-detected, none exceeded the screening criteria. However, screening criteria were not available for several constituents.

Exposure to surface soil at Site 2 would not be expected to result in any unacceptable human health risks.

Subsurface Soil

The risk-based screening and risk-ratio evaluation for subsurface soil at Site 2 is provided in Appendix E.1, Tables 2.2 and 2.2a.

Step 1: One constituent was identified as a COPC: hexavalent chromium.

Step 2: Cancer risk of 4×10^{-6}; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the MDE target risk level. The HI for hexavalent chromium is less than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. No constituents were identified as COPCs.

No screening criteria were available for dimethyl phthalate. Therefore, potential risks could not be evaluated for this constituent.

Of the constituents that were 100 percent non-detected, none exceeded the screening criteria. However, screening criteria were not available for several constituents.

Exposure to subsurface soil at Site 2 would not be expected to result in any unacceptable human health risks.

Groundwater

The risk-based screening and risk-ratio evaluation for groundwater at Site 2 is provided in Appendix E.1, Tables 2.3 and 2.3a. Total metals concentrations were used for the HHRS.

Step 1: Five constituents were identified as COPCs: arsenic, cobalt, iron, manganese, and thallium.

Step 2: Cumulative cancer risk of 2×10^{-5}; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark; however, it does exceed the MDE target risk level. Based on the MDE target risk level, arsenic would be a COPC. Cumulative target organ HIs ranged from 0.2 to 2; several of the HI values were greater than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. Constituents contributing to a cumulative target organ HI greater than 0.5 were identified as COPCs and included cobalt and thallium. These two constituents also contributed to a target organ HI greater than 1.

Step 3 was not performed because less than five samples were available for groundwater.

Of the constituents that were 100 percent non-detected, several VOCs, SVOCs, and PCBs exceeded their respective RSL. Screening criteria were not available for several constituents.

Based on the Navy guidance (Navy, 2000), exposure to groundwater at Site 2 may result in unacceptable human health risks associated with cobalt and thallium, based on potential use of groundwater as a future potable water supply. Following the MDE risk levels would result in arsenic, in addition to cobalt and thallium being identified as COPCs.

4.5 Ecological Risk Screening Results

The ERA for surface soil at Site 2 was conducted using the risk-ratio technique (CNO, 1999) described in Section 3.5. An overview of the various potential receptors and exposure pathways addressed in the ERA is discussed in Section 3.5.2. The supporting tables for the evaluation are presented in Appendix F.

Of the detected analytes, one VOC (methyl acetate), one SVOC (benzaldehyde), and six metals (aluminum, chromium, hexavalent chromium, iron, thallium, and vanadium) were retained as COPCs (Appendix F, Table 2).

The following constituents had an HQ greater than 1 and were retained for further evaluation: hexavalent chromium (HQ=5.63), chromium (HQ=2,000), thallium (HQ=160), and vanadium (HQ=58). An ESV was unavailable for methyl acetate, benzaldehyde, aluminum, and iron and these constituents were retained as well.

The maximum-detected concentrations of inorganic chemicals in Site 2 surface soils were compared to the 95% UTLs for Soil Grouping 2 sites (Appendix F, Table 10). None of detected concentrations of the COPCs identified in Site 2 surface soils exceeded the background 95% UTL value for Background Soil Group 2 sites.

Exposure to surface soil at Site 2 may result in unacceptable ecological risk associated with methyl acetate and benzaldehyde.

4.6 Findings and Recommendations

4.6.1 Findings

Based upon the observations of the fieldwork (DGM survey, test pitting, and DPT sampling) at Site 2, no evidence of waste material was encountered. The DGM survey identified three areas of interest where test pits were excavated; however, waste material was not encountered in any of the test pits and no other signs of waste material placement such as soil staining or odors were observed in either the test pits or the DPT soil borings. This finding supersedes the pre-SI understanding of the site in which burial and/or burn pits were thought to have been excavated at the site and served as the potential source area. As a result, no evidence of chemical burial and/or burning pits thought to be at the site was identified and these sources may not exist. Thus, a potential source area of contamination was not verified at Site 2 during this SI. Based on the results of the analytical data, VOCs, SVOCs, PCBs, and metals were detected in surface soil at Site 2, while VOCs, SVOCs, and metals were detected in subsurface soil and metals were detected in the groundwater. Based on the HHRS and ERA, the constituents presented in the following table may present potentially unacceptable risk and were retained as COPCs for Site 2.

	COPCs	
Media	**Human Health**	**Ecological**
Surface Soil	None	Methyl Acetate, Benzaldehyde
Subsurface Soil	None	N/A
Groundwater	Arsenic[1], Cobalt, Thallium	N/A

Note:

[1.] Only a COPC under MDE target risk levels.

N/A = Not Applicable

4.6.2 Risk Considerations

Human Health

While cobalt and thallium were retained as COPCs for groundwater considering both Navy and MDE target risk levels, and arsenic was retained as a COPC for groundwater considered MDE target risk levels, it is unlikely that the concentrations are representative of a potential site-related release and are more likely attributable to background concentrations. The rationale for this conclusion includes:

- Waste materials were not encountered in any of the test pits or DPT borings
- The pathway for metals in groundwater would ultimately be through leaching from the subsurface soil
- Arsenic, cobalt, and thallium were not detected in surface or subsurface soils above the RSL and/or the site-specific background values

Ecological

- As discussed in Section 3.5.4, methyl acetate and benzaldehyde were conservatively retained as COPCs because ESVs did not exist for these chemicals. However, these chemicals do not warrant further evaluation since there is uncertainty associated with their risk because their risk cannot be definitively determined

4.6.3 Recommendations

Site 2 was identified in the IAS as a chemical burial site and is shown on Figure 8-2 within the IAS. Additional historical research conducted during the UFP-SAP confirmed the location of Site2 and no other areas matching the description of Site 2 were found within the historical documents reviewed for the investigation (Appendix A of the UFP-SAP). Based on the results of the SI investigation indicating a lack of identified chemical disposal and/or burn pits and the results of the human health and ecological risk assessments and considerations indicating minimal to no risk, Site 2 is recommended for no further evaluation.

TABLE 4-1

Site 2 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S02-DP01			CBD-S02-DP02		CBD-S02-DP03		CBD-S02-DP04		CBD-S02-DP05	
Sample ID	CBD-S02-SS01-1012	CBD-S02-SB01-2628	CBD-S02-SB01P-2628	CBD-S02-SS02-1012	CBD-S02-SB02-2426	CBD-S02-SS03-1012	CBD-S02-SB03-2830	CBD-S02-SS04-1012	CBD-S02-SB04-2628	CBD-S02-SS05-1012	CBD-S02-SB05-2729
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	26 - 28	26 - 28	0 - 0.5	24 - 26	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 0.5	27 - 29
Chemical Name											
Volatile Organic Compounds (UG/KG)											
2-Butanone	2.8 J	2.3 J	1.3 J	4.6 J	3.6 J	16	0.64 UJ	3.8 J	0.53 U	4.2 J	0.6 U
2-Hexanone	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	7 J	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Acetone	40 B	6.6 B	4.9 U	120	18	350 J	26 J	86 B	5.3 U	160	6 U
Methyl acetate	0.99 B	1 B	0.78 B	1.5 B	1.6 B	790 J	2.6 B	1.1 B	1.3 B	1.4 B	1.7 B
Styrene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	1.7	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Toluene	0.21 J	0.22 J	0.49 U	5.1	0.29 B	2.8 B	0.64 UJ	0.52 J	0.53 U	0.4 B	0.6 U
Semivolatile Organic Compounds (UG/KG)											
Acenaphthene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.1 K	2 U
Anthracene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.1 K	2 U
Benzaldehyde	19 UL	19 UL	18 UL	18 UL	18 UL	14 L	20 UL	18 UL	19 UL	25 L	20 UL
Benzo(a)anthracene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	2.1 J	1.9 U	6.6 K	2 U
Benzo(a)pyrene	0.74 U	0.76 U	0.73 U	0.73 U	0.73 U	0.77 U	0.81 U	1.1 J	0.76 U	6.7	0.81 U
Benzo(b)fluoranthene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	2.5 J	3.8 U	9.6 K	4 U
Benzo(g,h,i)perylene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.4 J	1.9 U	2.9 K	2 U
Benzo(k)fluoranthene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	5.9 K	4 U
Butylbenzylphthalate	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	22 J	3.8 U	110 K	4 U
Chrysene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 J	1.9 U	7 K	2 U
Dimethyl phthalate	3.7 U	3.8 U	3.7 U	2.6 J	2.1 J	3.8 U	4 U	2.5 J	3.8 U	3.7 U	4 U
Fluoranthene	1.1 J	1.9 U	1.8 U	1.1 J	1.8 U	1.9 U	2 U	4.6 J	1.9 U	9.9 K	2 U
Fluorene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.1 K	2 U
Indeno(1,2,3-cd)pyrene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 K	4 U
Phenanthrene	1.1 J	1.9 U	1.8 U	1.1 J	1.8 U	1.2 J	2 U	1.8 J	1.9 U	5.5 K	2 U
Pyrene	3.7 U	3.8 U	3.6 U	3.6 U	3.6 U	3.8 U	4 U	3.9 J	3.8 U	11 K	4 U
Pesticide/Polychlorinated Biphenyls (UG/KG)											
Aroclor-1260	14 U	15 U	14 U	14 U	14 U	3.6 J	16 U	14 U	15 U	5.1 J	16 U
Total Metals (MG/KG)											
Aluminum	8,800	2,700	2,300	7,600	2,000	12,000	2,000	10,000	2,100	7,300	2,600
Antimony	0.19	0.12	0.22	0.2	0.23	0.25	0.11	0.21	0.17	0.19	0.18
Arsenic	3.3 L	1.8 J	2.8 J	3.5	1.4	3.4	1.5	5.1	2.6	4.4	2.6
Barium	29	15 J	7.8 J	16	11	27	14	30	4.9	12	12
Beryllium	0.28	0.49	0.42	0.24	0.23	0.27	0.24	0.36	0.22	0.19	0.27
Cadmium	0.038 J	0.072	0.016 J	0.044 J	0.037 J	0.035 J	0.028 J	0.031 J	0.089	0.021 B	0.055
Calcium	420	120 B	42 B	210 B	150 B	400	51 B	200 B	100 B	320	94 B
Chromium (hexavalent)	2.25	1.12	1.02	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	14 L	9.1	11	12	9.4	15	8	15	7.2	9.6	11
Cobalt	2.9	0.99	0.84	1.5	1	2	0.43	2.3	0.68	0.83	0.77
Copper	5.2	1.5 J	2.2 J	3.8	1.9	5.5	1	4.5	1.2	3.7	2.2
Iron	12,000	4,500 J	16,000 J	11,000	3,200	17,000	4,200	14,000	3,800	12,000	7,300
Lead	8.9	2.6	2.4	8.4	1.5	7.6	1.9	8.2	1.8	5.9	2.2
Magnesium	820	570 J	380 J	640	500	820	480	710	530	520	530

TABLE 4-1

Site 2 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S02-DP01			CBD-S02-DP02		CBD-S02-DP03		CBD-S02-DP04		CBD-S02-DP05	
Sample ID	CBD-S02-SS01-1012	CBD-S02-SB01-2628	CBD-S02-SB01P-2628	CBD-S02-SS02-1012	CBD-S02-SB02-2426	CBD-S02-SS03-1012	CBD-S02-SB03-2830	CBD-S02-SS04-1012	CBD-S02-SB04-2628	CBD-S02-SS05-1012	CBD-S02-SB05-2729
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	26 - 28	26 - 28	0 - 0.5	24 - 26	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 0.5	27 - 29
Manganese	49	7.9 J	14 J	47	7.4	55	4.6	45	9.1	23	14
Mercury	0.0062 J	0.017 U	0.017 U	0.021 J	0.017 U	0.019 J	0.017 U	0.017 U	0.017 U	0.0071 J	0.017 U
Nickel	8.2	2.8 J	1.5 J	2.9	2.1	4.2	1.3	4.3	3.2	1.7	2.8
Potassium	450	440	390	570	370	660	370	650	400	590	470
Selenium	0.26	0.1 U	0.18 B	0.32	0.17	0.22	0.13	0.42	0.1 U	0.3	0.16
Silver	0.054	0.022 B	0.025 J	0.039 J	0.029 J	0.046 J	0.023 B	0.034 J	0.024 B	0.029 J	0.026 B
Thallium	0.13	0.086	0.057	0.1	0.091	0.16	0.076	0.14	0.08	0.067	0.12
Vanadium	21	4.3 J	16 J	18	3.5	29	4.1	23	3.2	15	7.2
Zinc	17 B	21 B	12 B	15 B	11 B	22	13 B	18 B	20 B	13 B	13 B
Wet Chemistry											
pH (ph)	6.8	NA	NA	5	NA	4.9	NA	5	NA	5.7	NA
Total organic carbon (TOC) (mg/kg)	2,000	NA	NA	1,300	NA	1,000 J	NA	3,000	NA	4,200	NA

, , 01/00/1900

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE 4-2

Site 2 Detected Analytical Results - Groundwater

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S02-DP01
Sample ID	CBD-S02-GW01-1012
Sample Date	10/16/12
Chemical Name	
Volatile Organic Compounds (UG/L)	
No Detections	
Semivolatile Organic Compounds (UG/L)	
No Detections	
Pesticide/Polychlorinated Biphenyls (UG/L)	
No Detections	
Total Metals (UG/L)	
Aluminum	650
Antimony	0.26 J
Arsenic	1.2
Barium	100
Cadmium	0.27
Calcium	21,000
Chromium	6
Cobalt	8.2
Iron	3,100
Magnesium	5,400
Manganese	180
Nickel	24
Potassium	8,000
Selenium	2.1
Sodium	7,200
Thallium	0.3 J
Vanadium	2.6
Dissolved Metals (UG/L)	
Antimony	0.27 J
Arsenic	0.27 J
Barium	73
Cadmium	0.51
Calcium	18,000
Chromium	0.53 J
Cobalt	7.1
Iron	2,000
Magnesium	6,600
Manganese	76
Nickel	15
Potassium	7,100
Sodium	7,500
Thallium	0.43 J
Vanadium	0.078 J
Zinc	53

Notes:

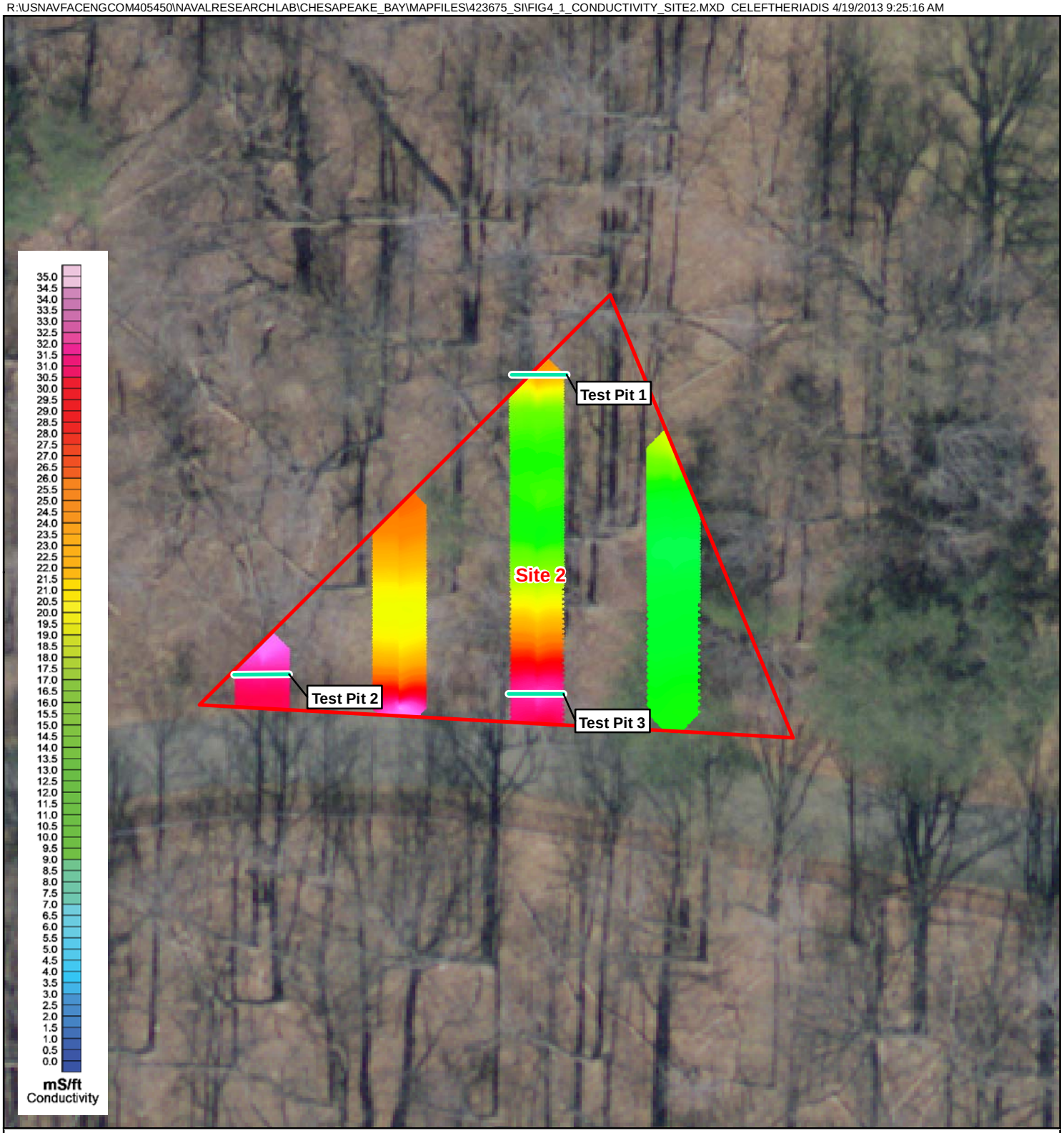
Shading indicates detection

J - Analyte present. Value may or may not be accurate or precise

MG/L - Milligrams per liter

UG/L - Micrograms per liter

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG4_1_CONDUCTIVITY_SITE2.MXD CELEFTHERIADIS 4/19/2013 9:25:16 AM



Legend

- Test Pits
- AOC Boundary

N

0 12.5 25

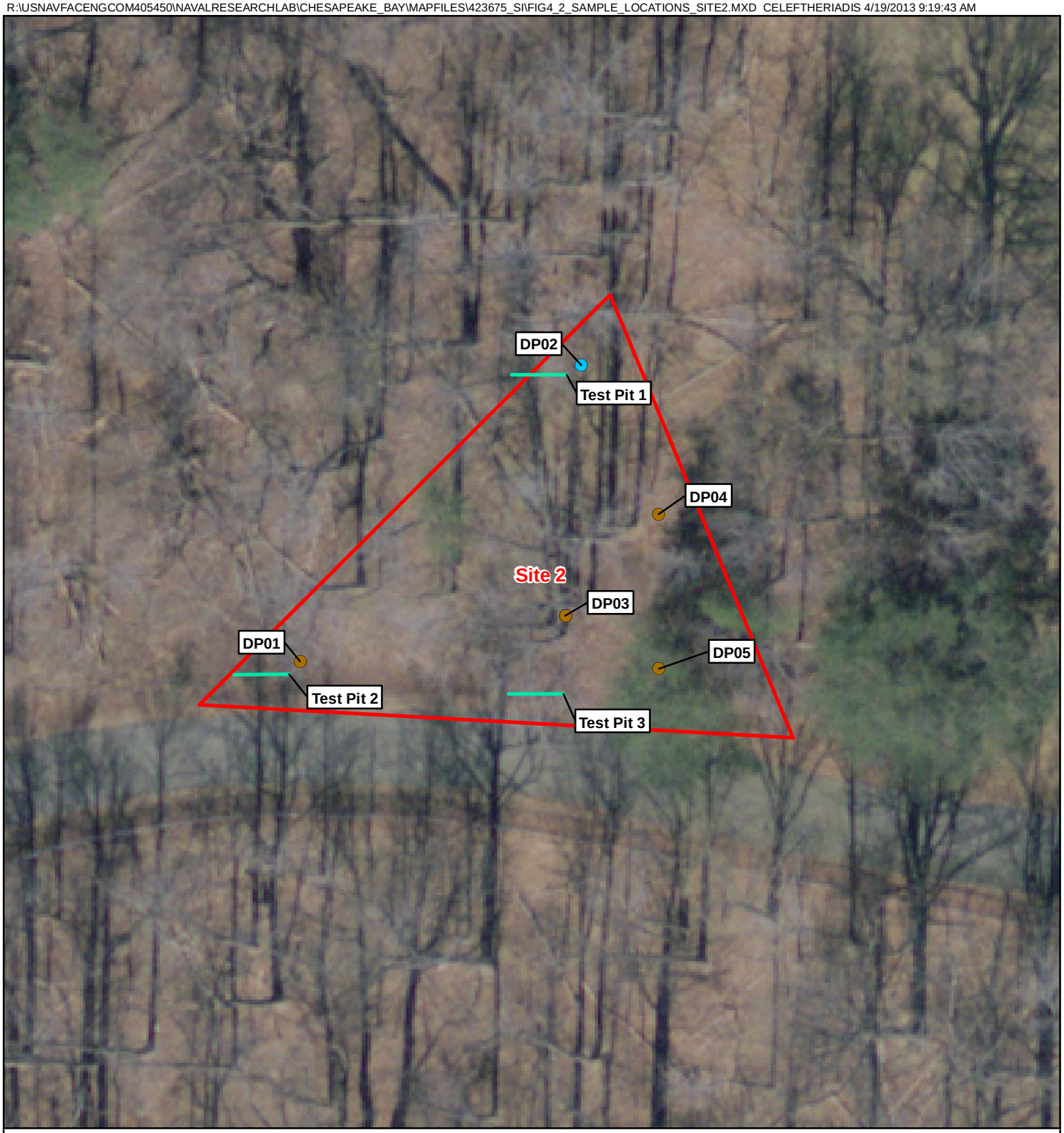
Feet

1 inch = 25 feet

Figure 4-1
Site 2 Test Pit Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

CH2MHILL

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG4_2_SAMPLE_LOCATIONS_SITE2.MXD CELEFTHERIADIS 4/19/2013 9:19:43 AM



Legend

- Co-located Surface Soil and Subsurface Soil Location
- Co-located Surface Soil, Subsurface Soil and Groundwater Location
- Test Pits
- AOC Boundary

N

0 12.5 25 Feet

1 inch = 25 feet

Figure 4-2
Site 2 Sample Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

CH2MHILL

SECTION 5

Site 3 - Landfill No. 1

5.1 Site Description

Site 3, also known as Landfill No. 1 or "Old Junk Row," is located on the western portion of NRL-CBD, south and adjacent to the main access road (**Figure 5-1**). According to the IAS, the site consisted of four to six 25-foot by 25-foot by 20-foot-deep excavation pits occupying 3,750 ft^2 (NEESA, 1984). However, after land-filling operations ceased the site was used as open storage, during which time "best management practices" were followed and the potential for undocumented spills remained. A photograph from April 1958 shows the site during the time it was used as open storage. Based on use of the site as a storage area, the current site occupies an area of 81,411 ft^2. The site is relatively flat with an approximate elevation of 125 feet amsl. The area occupying the site is currently used as maintained office space consisting of three research buildings (Buildings 301, 307, and 314) and a parking lot.

Landfill No. 1 was operational from 1942 through 1950. As previously mentioned, the landfill consisted of four to six pits and accepted three types of waste: municipal waste such as household garbage and tree trimming refuse, shop wastes such as wooden boxes, cardboard cartons, oily rags, absorbent materials, empty oil cans, lubricant cans, and paint sludges, and non-toxic laboratory waste such as paper towels, cardboard boxes, and small quantities of waste solvents (NEESA, 1984). Once the landfill was filled with refuse to within 4 feet of ground surface, the remaining space was backfilled with excavated soil to ground surface (NEESA, 1984). After the landfill was closed, the area on top of the landfill was designated "Old Junk Row" and used as open storage for disabled heavy equipment, demolition debris, and out-of-service laboratory equipment used in radar, sonar, and optics research (NEESA, 1984). During a site visit while the IAS was being conducted, crusted and stained soils were observed in the area. In the late 1980s, research buildings were constructed at the site in association with development of the Fire Testing Area.

5.2 Investigation Summary

5.2.1 Digital Geophysical Mapping Survey

A DGM survey was completed along 17 transects located across Site 3. Numerous sources of interference were present at Site 3 at the time of the geophysical survey, including buildings, roadways, parking lots, and underground utilities. As is evident at Site 3 and typical of EM31 surveys in general, the effect of buildings in the data may extend more than 10 feet laterally from a building edge due to the relatively large EM31 instrument "footprint." In these instances, potential subsurface features of interest are generally masked in the data, and no reliable assessment of subsurface conditions is possible.

The conductivity results are shown on Figure 5 in Appendix A. The conductivity response data appeared to be more greatly impacted by these sources of interference compared to the inphase data (Appendix A, Figure 6), as evidenced by the elevated responses (pink colors) recorded over roadways and parking lots. Both components appeared to delineate underground utility lines (linear anomalies extend across multiple transects), particularly those extending parallel to the main road. However, the area within the blue rectangle on Figure 5 of Appendix A appeared to represent the portion of the site where elevated EM31 responses may be associated with subsurface features.

5.2.2 Test Pitting

Two test pit locations (**Figure 5-1**) were advanced at Site 3. One location was selected on Transect 11 and another on Transect 12. The complete test pit logs are located in Appendix B. A brief summary of the results for each test pit are provided as follows.

Test Pit 1 (Transect 12) – The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of silty sand. A piece of rope was encountered at 1 foot bgs in one of the sidewalls of the test pit but no other signs of waste material or soil staining were encountered in this test pit.

Test Pit 2 (Transect 11) - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of silty sand. No signs of waste material or soil staining were encountered in this test pit.

5.2.3 Direct-push Technology Soil Sampling

Based on the lack of evidence from test pitting indicating that landfilling activities occurred at the site; five DPT sampling locations (DP01 through DP05) were spatially distributed across the site (**Figure 5-2**). Soil borings were advanced to maximum depth of 24 feet bgs and no signs of waste materials or soil staining were encountered in any of the DPT locations. Soil boring logs for each location are presented in Appendix C. Co-located surface soil and subsurface soil samples were collected from each of the five DPT sampling locations. Surface soil samples were collected from a depth of 0 to 6 inches bgs, while subsurface soil samples were collected from a depth ranging from 13 feet to 22 feet bgs. All samples were analyzed in accordance with the UFP-SAP.

5.2.4 Direct-push Technology Groundwater Sampling

Three groundwater samples were identified in the UFP-SAP to be collected from Site 3. However, during the soil sampling, sufficient groundwater was not encountered at depths up to 24 feet bgs, which was the maximum depth of the soil borings. Temporary wells were placed at locations DP01, DP04 and DP05. Due to the lack of groundwater, a groundwater analytical sample was not collected for Site 3.

5.3 Analytical Results

A summary of the constituents detected in soil are presented in **Table 5-1**. Data tables with the complete analytical results for Site 3 are located in Appendix D. The soil analytical data were evaluated with respect to potential human health receptors (Section 5.4) and ecological receptors (Section 5.5). The constituents detected in soil at Site 3 are discussed as follows.

5.3.1 Surface Soil Analytical Results

A total of five surface soil samples were collected at Site 3 during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

VOCs – Four VOCs (4-methyl-2-pentanone, acetone, chloroform, and trichlorofluoromethane [Freon-11]) were detected in surface soil samples. The detections were limited to two locations, DP03 and DP05.

SVOCs – Eleven SVOCs (acenaphthene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene, and pyrene) were detected in surface soil samples. The majority of the detections were found at location DP04.

Pesticides and PCBs – One PCB, Aroclor-1260, was detected at all five locations.

Metals – Twenty five metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in surface soil samples. Detections were found at all sample locations.

Wet Chemistry (pH and TOC) – pH ranged from 5.4 to 6.6, while TOC ranged from 1,100 mg/kg to 11,000 mg/kg.

5.3.2 Subsurface Soil Analytical Results

A total of five subsurface soil samples were collected at Site 3 during the October 2012 field event. The results of the subsurface soil sampling are summarized as follows.

VOCs – Seven VOCs (benzene, ethylbenzene, m- and p-xylene, methylcyclohexane, methylene chloride, toluene, and Freon-11) were detected in subsurface soil samples. The majority of the detections were associated with the sample collected from location DP04 at a depth of 18 to 20 feet bgs.

SVOCs – No SVOCs were detected in subsurface soil.

Pesticides and PCBs – One PCB, Aroclor-1260, was detected in subsurface soil at two locations (DP03 and DP04).

Metals – Twenty-four metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in subsurface soil samples. Multiple detections were found at all sample locations.

5.4 Human Health Risk Screening

The HHRS for Site 3 was conducted in three steps using the risk-ratio technique (Navy, 2000) described in detail in Section 3.4. Results were reported for both the Navy and the MDE target risk levels. An overview of the various potential receptors and exposure pathways addressed in the HHRS is discussed in Section 3.4.1. The supporting tables for the evaluation are presented in Appendix E.2.

Surface Soil

The risk-based screening and risk-ratio evaluation for surface soil at Site 3 are provided in Appendix E.2, Tables 2.1 through 2.1b.

Step 1: Three constituents were identified as COPCs: benzo(a)pyrene, Aroclor-1260, and arsenic.

Step 2: Cumulative cancer risk of 5×10^{-5}; this value does not exceed the 5×10^{-5} Navy risk-ratio screening benchmark; however, it does exceed the MDE target risk level. Based on the MDE target risk level, benzo(a)pyrene, Aroclor-1260, and arsenic would be COPCs. Both target organ HIs were 0.4; less than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI. No constituents were identified as COPCs compared to the Navy target levels; however, benzo(a)pyrene, Aroclor-1260, and arsenic are COPCs based on the MDE target risk level.

Step 3 (for MDE target level only): Cumulative cancer risk of 5×10^{-5} was calculated; this value is greater than the 1×10^{-5} target risk level. The cumulative corresponding HI was less than 1. Constituents contributing to the cumulative cancer risk were identified as COPCs under MDE target risk levels and include benzo(a)pyrene, Aroclor-1260, and arsenic.

Of the constituents that were 100 percent non-detected, the maximum detected limit for PCBs (Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, and Aroclor-1254) exceeded their respective RSL. Screening criteria were not available for several constituents.

Exposure to surface soil at Site 3 would not be expected to result in unacceptable human health risks based on the Navy target risk levels; however, based on the MDE target risk levels, exposure to surface soil may result in unacceptable human health risks associated with benzo(a)pyrene, Aroclor-1260, and arsenic.

Subsurface Soil

The risk-based screening and risk-ratio evaluation for subsurface soil at Site 3 are provided in Appendix E.2, Tables 2.2 through 2.2a.

Step 1: Two constituents were identified as COPCs: hexavalent chromium, and manganese.

Step 2: Cumulative cancer risk of 2×10^{-6}; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the MDE target risk level. Target organ HI was 0.2. This HI value is less than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. No constituents were identified as COPCs based on either Navy or MDE target risk levels.

Of the constituents that were 100 percent non-detected, none exceeded the screening criteria. However, screening criteria were not available for several constituents.

Exposure to subsurface soil at Site 3 would not be expected to result in any unacceptable human health risks.

5.5 Ecological Risk Screening

The ERA for surface soil at Site 3 was conducted using the risk-ratio technique (CNO, 1999) described in detail in Section 3.5. An overview of the various potential receptors and exposure pathways addressed in the ERA is discussed in Section 3.5.2. The supporting tables for the evaluation are presented in Appendix F.

Of the detected analytes, one SVOC (benzo[b]fluoranthene), one PCB (Aroclor-1260), and seven metals (aluminum, chromium, cyanide, iron, selenium, thallium, and vanadium) were retained as COPCs (Appendix F, Table 3).

The following constituents had an HQ greater than 1 and were retained for further evaluation: benzo(b)fluoranthene (HQ=1.2), Aroclor-1260 (HQ=55), chromium (HQ=1,600), cyanide (HQ=8.6), selenium (HQ=1.85), thallium (HQ=240), and vanadium (HQ=36). An ESV was unavailable for aluminum and iron and these constituents were retained as well.

The maximum detected concentrations of inorganic chemicals in Site 3 surface soils were compared to the 95% UTLs for Soil Grouping 3 sites (Appendix F, Table 10). None of detected concentrations of the COPCs identified in Site 3 surface soils exceeded the background 95% UTL value for Background Soil Group 3 sites.

Exposure to surface soil at Site 3 may result in unacceptable ecological risk associated with benzo(b)fluoranthene and Aroclor-1260.

5.6 Findings and Recommendations

5.6.1 Findings

Based upon the observations of the fieldwork (DGM survey, test pitting, and DPT sampling), no evidence of waste material was encountered. The DGM survey identified two areas of interest where potential disposal pits may have been located and test pits were excavated. However, waste material was not encountered in the excavations and no other signs of waste material placement such as soil staining or odors were observed in either the test pits or the DPT soil borings. This set of observations supersedes the pre-SI understanding and supports the conclusion that either the disposal pits may not have existed or that there is no remaining material from them at the site.

Based on the results of the analytical data, VOCs, SVOCs, PCBs, and metals were detected in surface and subsurface soils at Site 3. Based on the HHRS and ERA, the constituents presented in the following table may present potentially unacceptable risk and were retained as COPCs for Site 3.

	COPCs	
Media	**Human Health**	**Ecological**
Surface Soil	Benzo(a)pyrene[1.], Aroclor-1260[1], and Arsenic[1.]	Benzo(b)fluoranthene and Aroclor-1260
Subsurface Soil	None	N/A
Groundwater	N/A	N/A

Note:

[1.] Only a COPC under MDE target risk levels.

Based on the risk-driving COPCs, which were identified during the human health and ERSs, only surface soil is potentially impacted at the site. The lack of identified source material (disposal pits) in the subsurface soil and the fact that only surface soil at the site is potentially impacted suggests that it is likely that the source of contamination at the site may not have originated from the disposal pits as originally identified. The contamination may be from another source such as poor housekeeping associated with storage of disabled equipment, demolition debris, and out-of-service laboratory equipment during the time when the site was referred to as “Old Junk Row.”

5.6.2 Recommendations

Site 3 is recommended for further evaluation based upon potentially unacceptable human health (based on MDE target risk levels only) and ecological risks associated with benzo(a)pyrene, benzo(b)fluoranthene, Aroclor-1260, and arsenic in surface soil.

TABLE 5-1

Site 3 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S03-DP01			CBD-S03-DP02		CBD-S03-DP03		CBD-S03-DP04		CBD-S03-DP05	
Sample ID	CBD-S03-SS01-1012	CBD-S03-SB01-1315	CBD-S03-SB01P-1315	CBD-S03-SS02-1012	CBD-S03-SB02-2022	CBD-S03-SS03-1012	CBD-S03-SB03-2022	CBD-S03-SS04-1012	CBD-S03-SB04-1820	CBD-S03-SS05-1012	CBD-S03-SB05-1315
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12
Sample Depth (feet)	0 - 0.5	13 - 15	13 - 15	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	13 - 15
Chemical Name											
Volatile Organic Compounds (UG/KG)											
4-Methyl-2-pentanone	0.42 UJ	0.9 UJ	0.56 UJ	0.5 UJ	0.77 UJ	3 J	0.67 UJ	0.44 UJ	0.65 UJ	0.44 UJ	0.47 UJ
Acetone	41 B	9 U	5.6 U	71 B	9.1 B	31 B	9.5 B	62 B	29 B	65 J	7.6 B
Benzene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.38 J	0.44 U	0.47 U
Chloroform	0.21 U	0.45 U	0.22 B	0.25 U	0.49 B	0.28 U	0.24 B	0.18 B	0.33 U	0.14 J	0.23 U
Ethylbenzene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.22 J	0.44 U	0.47 U
m- and p-Xylene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.43 J	0.44 U	0.47 U
Methylcyclohexane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.18 J	0.44 U	0.47 U
Methylene chloride	0.42 U	0.9 U	0.56 U	0.5 U	0.49 B	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	18
Toluene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	1.1 J	0.44 U	0.47 U
Trichlorofluoromethane (Freon-11)	0.21 U	0.45 U	0.28 U	0.25 U	1.5 J	0.28 J	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Semivolatile Organic Compounds (UG/KG)											
Acenaphthene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.5 J	2.5 U	1.8 U	2 U
Benzo(a)pyrene	7.4 U	4 U	3.8 U	3.7 U	4.6 U	40	3.9 U	48	5 U	2.9 U	3.2 U
Benzo(b)fluoranthene	2.3 B	3.9 U	3.7 U	7.4 B	5.7 U	4 B	4.8 U	120	4.9 U	23 B	4 U
Benzo(g,h,i)perylene	1.8 U	2 U	1.9 U	3 B	2.9 U	1.8 B	2.4 U	42	2.5 U	8.2 B	2 U
Benzo(k)fluoranthene	3.7 U	3.9 U	3.7 U	3 B	5.7 U	2.6 B	4.8 U	58	4.9 U	7.4 B	4 U
Dibenz(a,h)anthracene	7.4 U	4 U	3.8 U	3.7 U	4.6 U	4.5 J	3.9 U	7.4 J	5 U	2.9 U	3.2 U
Fluoranthene	1.8 U	2 U	1.9 U	3.7 B	2.9 U	3.3 B	2.4 U	39	2.5 U	11 B	2 U
Fluorene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.1 J	2.5 U	1.8 U	2 U
Indeno(1,2,3-cd)pyrene	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	37	4.9 U	7.1 B	4 U
Phenanthrene	1.1 B	2 U	1.9 U	1.9 B	2.9 U	2.2 B	2.4 U	21	2.5 U	5.9 B	2 U
Pyrene	1.5 B	3.9 U	3.7 U	4.5 B	5.7 U	3.7 B	4.8 U	68	4.9 U	13 B	4 U
Pesticide/Polychlorinated Biphenyls (UG/KG)											
Aroclor-1260	120	15 U	15 U	41	22 U	5,500	81	2,100	17 J	150	16 U
Total Metals (MG/KG)											
Aluminum	5,700	1,500	1,600	5,800	5,700	4,500	5,400	6,300	6,100	7,900	2,500
Antimony	0.12	0.071 J	0.065 J	0.35	0.18	0.9	0.083 J	0.36	0.1	0.08 J	0.081 J
Arsenic	1.6	1.5	1.6	2.1	5.2	14	2.1	2.2	2.9	1.2	1.2
Barium	37	4.5	4.6	27	14	9.8	13	27	13	44	5
Beryllium	0.51	0.12	0.13	0.33	0.7	0.26	1.1	0.3	0.45	0.64	0.12
Cadmium	0.091	0.017 B	0.018 B	0.13	0.18	0.055	0.34	0.16	0.93	0.17	0.016 B
Calcium	4,100	300	290	390	430	420	970	390	36,000	180	73 B
Chromium (hexavalent)	0.15 J	0.18 J	0.58	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	7.6	6.7	8.4	11	24	12	22	8.7	26	6.2	14
Cobalt	2.6	0.48	0.5	1.9	1.2	1.4	1.7	2.3	5	3.4	0.4
Copper	2.9	1	1.1	2.6	3.1	3.9	2.8	3	3	1.9	1.6
Cyanide	0.055 U	0.059 U	0.056 U	0.055 U	0.086 U	0.055 U	0.072 U	0.054 U	0.074 U	0.043 J	0.061 U
Iron	5,600	2,300	2,600	6,400	18,000	8,100	9,700	8,400	13,000	5,600	4,400
Lead	5.9	1.4	1.8	7.2	5	2.9	3.7	11	4.4	4.3	1.9
Magnesium	1,400	390	460	660	1,700	480	1,800	630	19,000	630	530

TABLE 5-1

Site 3 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S03-DP01			CBD-S03-DP02		CBD-S03-DP03		CBD-S03-DP04		CBD-S03-DP05	
Sample ID	CBD-S03-SS01-1012	CBD-S03-SB01-1315	CBD-S03-SB01P-1315	CBD-S03-SS02-1012	CBD-S03-SB02-2022	CBD-S03-SS03-1012	CBD-S03-SB03-2022	CBD-S03-SS04-1012	CBD-S03-SB04-1820	CBD-S03-SS05-1012	CBD-S03-SB05-1315
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12
Sample Depth (feet)	0 - 0.5	13 - 15	13 - 15	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	13 - 15
Manganese	160	5.4	4.2	57	8.3	20	13	69	320	140	4
Mercury	0.012 J	0.016 U	0.01 J	0.0095 J	0.017 U	0.017 U	0.017 U	0.011 J	0.017 U	0.0078 J	0.017 U
Nickel	10	0.62	0.67	5.7	2.5	2.3	4.4	4.5	18	6.2	0.86
Potassium	300	310	330	400	1,500	350	1,100	340	1,800	250	410
Selenium	0.25	0.098 B	0.12 B	0.18 B	1.4	0.96	0.42	0.28	0.62	0.4	0.39
Silver	0.024 J	0.033 J	0.035 J	0.031 J	0.054	0.026 J	0.047 J	0.034 J	0.072	0.024 J	0.042 J
Sodium	200	25 U	13 B	17 B	77 B	26 B	46 B	24 B	200	15 B	20 B
Thallium	0.19	0.19	0.17	0.2	0.32	0.08	0.22	0.2	0.19	0.24	0.11
Vanadium	9	4.7	5.2	11	14	18	9.3	12	11	8.2	5.4
Zinc	35	6.6	7.5	20 B	54	8.6 B	51	30	45	45	8.4
Wet Chemistry											
pH (ph)	5.9	NA	NA	6.3	NA	6.6	NA	5.4	NA	5.7	NA
Total organic carbon (TOC) (mg/kg)	1,300	NA	NA	1,300	NA	1,100 U	NA	6,800	NA	11,000	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

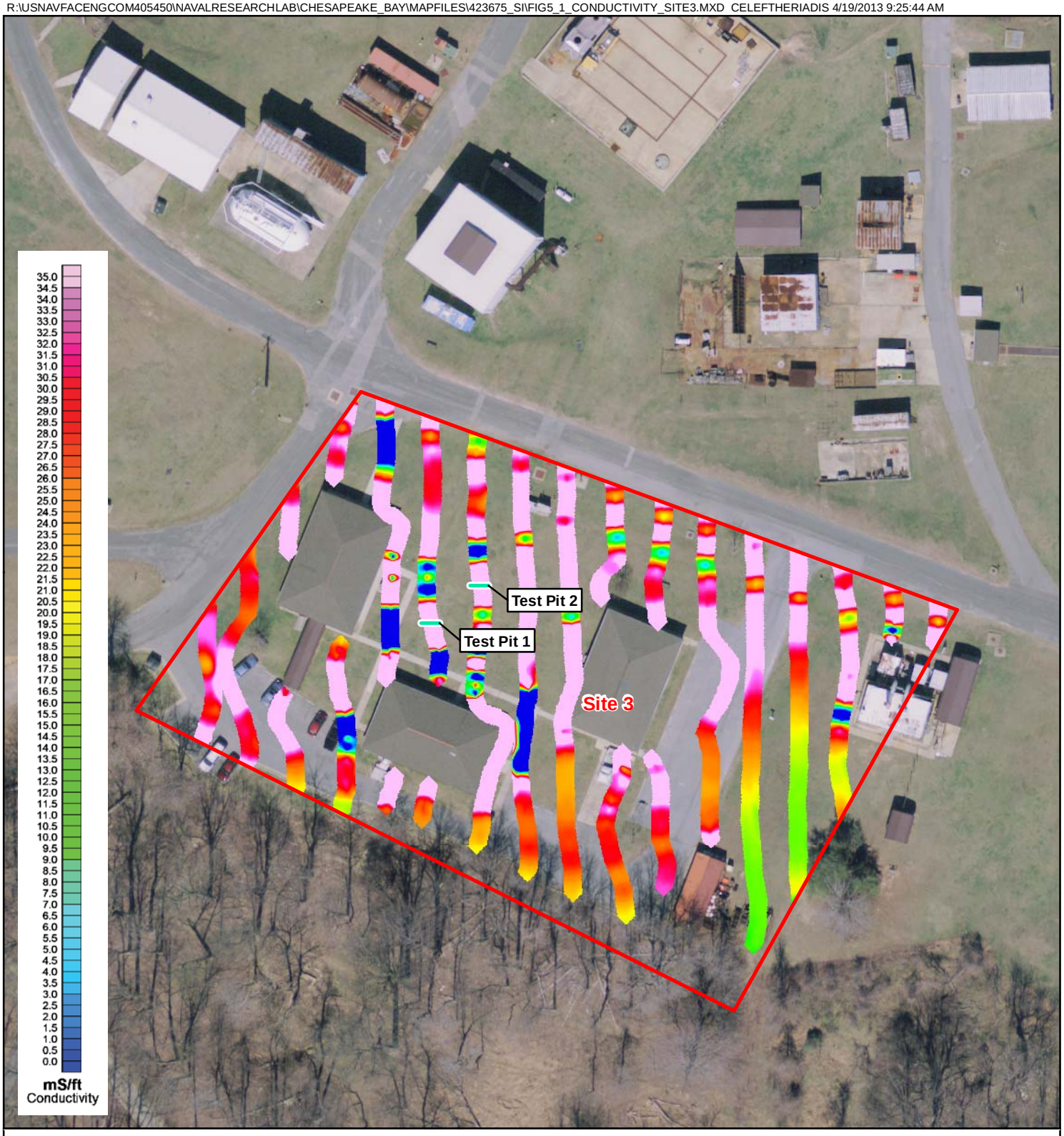
UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG5_1_CONDUCTIVITY_SITE3.MXD CELEFTHERIADIS 4/19/2013 9:25:44 AM



Legend

- Test Pits
- Site Boundary

N

0 37.5 75

Feet

1 inch = 75 feet

Figure 5-1
Site 3 Test Pit Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

CH2MHILL

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG5_2_SAMPLE_LOCATIONS_SITE3.MXD CELEFTHERIADIS 4/19/2013 9:20:15 AM



Legend

- Co-located Surface Soil and Subsurface Soil Location
- Test Pits
- Site Boundary

N

0 37.5 75

Feet

1 inch = 75 feet

Figure 5-2
Site 3 Sample Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

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SECTION 6

Site 4 - Landfill No. 2

6.1 Site Description

Site 4, also known as Landfill No. 2, is located on the western portion of NRL-CBD and is located west and adjacent to Site 3 (**Figure 6-1**). Landfill No. 2 was operational from 1950 through 1958. The IAS presented a similar site description for Site 4 as that presented for Site 3 (that is, four to six pits that were 25 feet by 25 feet by 20 feet deep), with the exception that no open storage was conducted on the site after the landfill was closed. Based on ground disturbance observed in historical photographs dated March 1955 and April 1958, the site boundary encompasses an area of 21,637 ft^2. Currently, the site is a relatively flat, large, open mowed grassy area with an approximate elevation of 135 feet amsl. During a recent site visit several small depressions were observed on the ground surface within the area of Site 4.

6.2 Investigation Summary

6.2.1 Digital Geophysical Mapping Survey

A DGM survey was completed along nine transects located across Site 4. During the historical records search a suspected former disposal pit was identified (denoted by the orange box shown on Figures 7 and 8 in Appendix A). The EM31 transects were intentionally spaced closer together at this location because of this suspected disposal area. However, the EM31 data did not indicate the presence of buried debris at this location along Transect 58. EM31 conductivity anomalies represented by the light and dark blue colors were identified at four locations (Transects 21, 23, 47, and 57). Corresponding inphase anomalies (Appendix A, Figure 8) were subtle and correspond to positive values (yellow colors) and negative values (light blue colors) slightly outside the range of interpreted background values. Buried metal can be represented in EM31 inphase data by both positive and negative values relative to the background. The subtle EM31 inphase results indicated that debris potentially associated with these four locations may possess minimal metal content, or the metal may be buried at greater depths at these locations.

6.2.2 Test Pitting

Five test pit locations (**Figure 6-1**) were selected at Site 4. One location was selected on each of the following transects: 21, 23, 47, 57, and 58. While no anomalies were identified associated with the suspected disposal pit, the CH2M project team elected to add a confirmatory test pit location on Transect 58 because of the documented disposal area. The complete test pit logs are located in Appendix B. A brief summary of the results for each test pit is provided as follows:

- **Test Pit 1 (Transect 23)** – The test pit was dug to a depth of 6 feet bgs. Soils encountered were described as consisting of sandy silt. Waste was encountered beginning at a depth of 4.5 feet and consisted of glass, metal (pipes and fencing), and melted plastic and charred items. The waste was visible from the sidewalls as well as from the floor of the excavation.
- **Test Pit 2 (Transect 58)** - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of sandy silt. No signs of waste material or soil staining were encountered in this test pit with the exception of a broken metal shovel encountered at 1 foot bgs.
- **Test Pit 3 (Transect 57)** - The test pit was dug to a depth of 6 feet bgs. Soils encountered were described as consisting of sandy silt. Waste was encountered beginning at a depth of 1 foot and extending to 6 feet bgs. Waste encountered consisted of wires, glass, brick, metal, and charred wood. A soil color changed was noted from light brown to black at a depth of 6 feet. The change in soil color was noted to coincide with the observation of charred wood at a depth of 6 feet bgs.

- **Test Pit 4 (Transect 47)** - The test pit was dug to a depth of 8.5 feet bgs. Soils encountered were described as consisting of sandy silt. Waste was encountered at a depth of 2 feet and consisted of metal and brick. No signs of soil staining were observed.
- **Test Pit 5 (Transect 21)** - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of sandy silt. Waste was encountered beginning at a depth of 1 foot and ended at a depth of 2.5 feet. The waste consisted of metal (wires and plates), charred materials, and plastic. No signs of waste material, or soil staining were encountered beyond 2.5 feet in this test pit.

6.2.3 Soil Sampling

Based on the evidence indicating that land-filling activities occurred at the site, co-located surface and subsurface soil samples were collected from five DPT sampling locations (DP01 through DP05) that were spatially distributed adjacent to test pits 1, 2, 3, 4, and 5 (**Figure 6-2**). An additional surface soil sample (DP06) was collected adjacent to test pit 3, which was located on top of one of the identified disposal areas. Soil borings were advanced to maximum depth of 24 feet bgs. Soil boring logs for each location are presented in Appendix C. Surface soil samples were collected from a depth of 0 to 6 inches bgs, while subsurface soil samples were collected from a depth ranging from 10 feet to 20 feet bgs. All samples were analyzed in accordance with the UFP-SAP.

6.2.4 Groundwater Sampling

Three temporary wells were installed at locations DP01, DP02, and DP03 (**Figure 6-2**). The temporary wells were screened between 12 and 22 feet bgs and allowed to equilibrate overnight. The following day one grab groundwater sample was collected from each well using a peristaltic pump, with the exception of location DP01 where sufficient groundwater was unable to be collected. A total of two groundwater samples were collected from DP02 and DP03 in accordance with the UFP-SAP and sent to the laboratory for analysis.

6.3 Analytical Results

A summary of the constituents detected in soil and groundwater are presented in **Tables 6-1 and 6-2** respectively. Data tables with the complete analytical results for Site 4 are located in Appendix D. The soil analytical data were evaluated with respect to potential human health receptors (Section 6.4) and ecological receptors (Section 6.5). The constituents detected in soil at Site 4 are discussed as follows.

6.3.1 Surface Soil Analytical Results

A total of six surface soil samples were collected at Site 4 during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

VOCs – Four VOCs (acetone, benzene, toluene, and Freon-11) were detected in surface soil samples at Site 4. Acetone was detected in all surface soil samples, while benzene, toluene, and Freon-11 were detected in one location each.

SVOCs – Twenty-two SVOCs (1,1-biphynyl, 2-methylnaphthalene, 4,6-dinitro-2-methylphenol, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, carbazole, chrysene, dibenz[a,h]anthracene, dibenzofuran, dimethyl phthalate, fluoranthene, fluorene, Indeno1,2,3-cd pyrene, naphthalene, phenanthrene, and pyrene) were detected in surface soil samples. The majority of the detections were found at locations DP03, DP04, and DP06, while location DP03 had the highest concentrations.

Pesticides and PCBs – One PCB, Aroclor-1260, was detected at four of the six sampling locations.

Metals – Twenty-four metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, thallium, vanadium, and zinc) were detected in surface soil samples. One or more detections were found at all sample locations.

Wet Chemistry (pH and TOC) – pH ranged from 5.2 to 6.2, while TOC ranged from 1,500 mg/kg to 11,000 mg/kg.

6.3.2 Subsurface Soil Analytical Results

A total of five subsurface soil samples were collected at Site 4 during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

VOCs – Two VOCs (acetone and Freon-11) were detected in subsurface soil samples. The detections were associated with the samples collected from DP01 and DP02, with acetone detected at both locations while Freon-11 was detected at DP02.

SVOCs – Ten SVOCs (4,6-dinitro-2-methylphenol, 4-chloroaniline, benzaldehyde, chrysene, dimethyl phthalate, fluoranthene, n-nitroso-di-n-propylamine, phenanthrene, phenol, and pyrene) were detected in subsurface soil. One or more detections were found in all sample locations except DP01. A significant reduction in SVOC detections in subsurface soil compared to surface soil was observed at location DP03.

Pesticides and PCBs – No pesticides or PCBs were detected in any of the subsurface soil samples.

Metals – Twenty-four metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, thallium, vanadium, and zinc) were detected in subsurface soil samples. Multiple detections were found at all sample locations.

6.3.3 Groundwater Analytical Results

Two groundwater samples were collected at Site 4 during the October 2012 field event. The results of the groundwater sampling are summarized as follows.

VOCs – No VOCs were detected in the groundwater samples.

SVOCs – Twelve SVOCs (4-methylphenol, acenaphthene, acetophenone, benzaldehyde, dibenzofuran, diethylphthalate, dimethyl phthalate, di-n-butylphthalate, fluoranthene, isophrone, phenol, and pyrene) were detected in the groundwater samples.

Pesticides and PCBs – No pesticides or PCBs were detected in the groundwater samples.

Metals – Twenty-one total metals (aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, silver, sodium, thallium, vanadium, and zinc) and 17 dissolved metals (arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, thallium, and zinc) were detected in the groundwater samples.

6.4 Human Health Risk Screening

The HHRS evaluation for Site 4 was conducted in three steps using the risk-ratio technique (Navy, 2000) described in detail in Section 3.4. Results were reported for both the Navy and the MDE target risk levels. An overview of the various potential receptors and exposure pathways addressed in the HHRS is discussed in Section 3.4.1. The supporting tables for the evaluation are presented in Appendix E.3.

Surface Soil

The risk-based screening and risk-ratio evaluation for surface soil at Site 4 are provided in Appendix E.3, Tables 2.1 through 2.1b.

Step 1: Seven constituents were identified as COPCs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1260, and hexavalent chromium.

Step 2: Cumulative cancer risk of 3×10^{-4}; this value is greater than the 5×10^{-5} Navy risk-ratio screening benchmark and 1×10^{-5} MDE target risk level. The cumulative target organ HI was 0.002; less than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. Constituents contributing to the cumulative cancer risk were identified as COPCs and included benzo(a)anthracene,

benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1260, and hexavalent chromium.

Step 3: Cumulative cancer risk of 3×10^{-4}; this value is greater than the 5×10^{-5} Navy risk-ratio screening benchmark and the MDE target risk level. Constituents contributing to the cumulative cancer risk were identified as COPCs and included: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1260, and hexavalent chromium . The majority of the potential cancer risk is associated with the PAHs.

No screening criteria were available for carbazole and dimethyl phthalate. Therefore, potential risks could not be evaluated for these constituents.

Of the constituents that were 100 percent non-detected, none exceeded the RSL. However, screening criteria were not available for several constituents.

Exposure to surface soil at Site 4 may result in unacceptable human health risks primarily associated with PAHs, with smaller contributions from PCBs and metals.

Subsurface Soil

The risk-based screening and risk-ratio evaluation for subsurface soil at Site 4 are provided in Appendix E.3, Tables 2.2 and 2.2a.

Step 1: One constituent was identified as a COPC: hexavalent chromium.

Step 2: Cumulative cancer risk of 5×10^{-6}; this value is less than the Navy 5×10^{-5} risk-ratio screening benchmark and the MDE target risk level. The cumulative corresponding HI was less than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. No constituents were identified as COPCs.

No screening criteria were available for dimethyl phthalate. Therefore, potential risks could not be evaluated for this constituent.

Of the constituents that were 100 percent non-detected, none exceeded the RSL. Screening criteria were not available for several constituents.

Exposure to subsurface soil at Site 4 would not be expected to result in any unacceptable human health risks.

Groundwater

The risk-based screening and risk-ratio evaluation for groundwater at Site 4 are provided in Appendix E.3, Tables 2.3 and 2.3a. Total metals concentrations were used for the HHRS.

Step 1: Nine constituents were identified as COPCs: aluminum, arsenic, cadmium, cobalt, iron, lead, manganese, thallium, and vanadium.

Step 2: Cumulative cancer risk of 3×10^{-4}; this value exceeds the 5×10^{-5} Navy risk-ratio screening benchmark and the 1×10^{-5} MDE target risk level. The constituent contributing to the cumulative cancer risk, arsenic, was identified as a COPC. Cumulative target organ HIs ranged from 0.4 to 8; six of the target organ HI values were greater than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and five of the values were greater than the MDE target HI of 1. Constituents contributing to a cumulative target organ HI greater than 0.5 were identified as COPCs and include aluminum, arsenic, cobalt, iron, manganese, thallium, and vanadium. The constituents contributing to a cumulative target organ HI greater than 1 were identified as COPCs based on MDE target levels and include arsenic, cobalt, iron, thallium, and vanadium. Additionally, lead is identified as a COPC, as one of the detected concentrations exceeded the screening level. However, as discussed in Section 3.4, potential risks associated with exposure to lead are not evaluated in the same manner as the other COPCs; therefore, lead is not included in the Step 2 evaluation.

Step 3 was not performed because less than five samples were available for groundwater.

Of the constituents that were 100 percent non-detected, a number of VOCs, 2 SVOCs, and PCBs, exceeded their respective RSL. Screening criteria were not available for several constituents.

Exposure to groundwater at Site 4 may result in unacceptable human health risks associated with aluminum, arsenic, cobalt, iron, lead, manganese, thallium, and vanadium, based on potential use of groundwater as a future potable water supply.

6.5 Ecological Risk Screening

The ERA for surface soil at Site 4 was conducted using the risk-ratio technique (CNO, 1999) described in detail in Section 3.5. An overview of the various potential receptors and exposure pathways addressed in the ERA is discussed in Section 3.5.2. The supporting tables for the evaluation are presented in Appendix F.

Of the detected analytes, 18 SVOCs (4,6-dinitro-2-methylphenol, acenaphthene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, carbazole, chrysene, dibenz[a,h]anthracene, dibenzofuran, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene, pyrene, and high molecular weight PAHs), one PCB (Aroclor-1260), and seven metals (aluminum, chromium, cyanide, iron, mercury, thallium, and vanadium) were retained as COPCs (Appendix F, Table 4).

The following constituents had an HQ greater than 1 and were retained for further evaluation: acenaphthene (HQ=3.1), anthracene (HQ=5.8), benzo(a)anthracene (HQ=31), benzo(a)pyrene (HQ=35), benzo(b)fluoranthene (HQ=39), benzo(g,h,i)perylene (HQ=8), benzo(k)fluoranthene (HQ=7.3), chrysene (HQ=26), dibenz(a,h)anthracene (HQ=2.3), fluoranthene (HQ=48), fluorene (HQ=2.1), indeno(1,2,3-cd)pyrene (HQ=8.3), phenanthrene (HQ=35), pyrene (HQ=45), high molecular weight PAHs (HQ=18.4), Aroclor-1260 (HQ=2.6), chromium (HQ=2,667), cyanide (HQ=5.2), mercury (HQ=1.45), thallium (HQ=270), and vanadium (HQ=62). Aluminum and iron were also retained because the site pH ranges from 5.2 to 6.2, and an ESV was not identified for 4,6-dinitro-2-methylphenol, carbazole, and dibenzofuran and these constituents were retained as well. An ESV was unavailable for aluminum and iron and these constituents were retained as well.

Maximum detected concentrations of inorganic chemicals in Site 4 surface soils are compared to the 95% UTLs for Soil Grouping 2 sites (Appendix F, Table 10). None of detected concentrations of the COPCs identified in Site 4 surface soils exceeded the background 95% UTL value for Background Soil Group 2 sites.

Exposure to surface soil at Site 4 may result in unacceptable ecological risk associated with acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene, high molecular weight PAHs and Aroclor-1260.

6.6 Findings and Recommendations

6.6.1 Findings

Based upon the observations of the fieldwork (DGM survey, test pitting, and DPT sampling), evidence of waste material was encountered in several locations. The DGM survey identified five areas of interest where test pits were excavated. Waste material was encountered in four of the five test pits with the depth waste was first encountered ranging from 1 to 8 feet bgs. No other signs of waste material placement such as soil staining or odors were observed the DPT soil borings. The observations from the SI field investigation indicate that waste disposal did occur at the site and that multiple pits may have been used as described in the IAS; however, the size of the pits could not be confirmed during this investigation.

Based on the results of the analytical data, VOCs, SVOCs, PCBs, and metals were detected in surface soil at Site 4. VOCs, SVOCs, and metals were detected in subsurface soil while SVOCs and metals were detected in groundwater. Based on the HHRS and ERA, the constituents presented in the following table may present potentially unacceptable risk and were retained as COPCs for Site 4.

Media	COPCs	
	Human Health	Ecological
Surface Soil	benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1260 and hexavalent chromium	4,6-dinitro-2-methylphenol, acenaphthene, anthracene, benzo(a) anthracene, benzo(a)pyrene, benzo(b)fluorathene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene, Aroclor-1260
Subsurface Soil	None	N/A
Groundwater	aluminum, arsenic, cobalt, iron, lead, manganese, thallium, vanadium	N/A

Based upon the COPCs presented, risk-driving contamination in soil is only present in surface soil at the site. This information suggests that the pre-SI understanding of these disposal pits as a potential source area may be incorrect, given the absence of subsurface soil COPCs.

6.6.2 Risk Considerations

Human Health

While aluminum, arsenic, cobalt, iron, lead, manganese, thallium, and vanadium were retained as COPCs for groundwater, it is unlikely that the concentrations are representative of a potential site-related release and are more likely attributable to background concentrations. The rationale for this conclusion includes:

- The pathway for metals in groundwater would ultimately be through leaching from the subsurface soil
- These metals were not detected in subsurface soil above the RSL and/or the site-specific background values
- Concentrations of these metals are lower in the filtered groundwater samples compared to the unfiltered groundwater samples, indicating they may be associated with particulates and suspended solids in the groundwater sample

Ecological

As discussed in Section 3.5.4.3 of the ERS, 4,6-dinitro-2-methylphenol, carbazole, and dibenzofuran were retained as COPCs because ESVs did not exist for these chemicals. However, these chemicals do not warrant further evaluation since there is uncertainty associated with their risk because their risk cannot be definitively determined.

6.6.3 Recommendations

Site 4 is recommended for further evaluation based upon potential unacceptable human health and ecological risks associated with acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene , indeno(1,2,3-cd)pyrene, phenanthrene, pyrene, Aroclor-1260, and hexavalent chromium in surface soil.

TABLE 6-1

Site 4 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S04-DP01			CBD-S04-DP02		CBD-S04-DP03		CBD-S04-DP04		CBD-S04-DP05		CBD-S04-SO06
Sample ID	CBD-S04-SS01-1012	CBD-S04-SS01P-1012	CBD-S04-SB01-1820	CBD-S04-SS02-1012	CBD-S04-SB02-1618	CBD-S04-SS03-1012	CBD-S04-SB03-1416	CBD-S04-SS04-1012	CBD-S04-SB04-1012	CBD-S04-SS05-1012	CBD-S04-SB05-1315	CBD-S04-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	18 - 20	0 - 0.5	16 - 18	0 - 0.5	14 - 16	0 - 0.5	10-12	0 - 0.5	13 - 15	0 - 0.5
Chemical Name												
Volatile Organic Compounds (UG/KG)												
Acetone	50 J	7.4 J	23	22 J	28 J	100 J	5.6 UJ	57 J	5.2 UJ	100	12 U	41 J
Benzene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.18 J	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Toluene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.2 J	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Trichlorofluoromethane (Freon-11)	0.26 J	0.21 U	0.3 U	0.29 U	0.32 J	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Semivolatile Organic Compounds (UG/KG)												
1,1-Biphenyl	19 U	19 U	20 U	19 U	19 U	13 J	19 U	18 U	19 U	19 U	20 U	18 U
2-Methylnaphthalene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	32	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
4,6-Dinitro-2-methylphenol	19 U	19 U	20 U	23 J	19 U	18 U	19 U	18 U	22 J	19 U	20 U	18 U
4-Chloroaniline	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	18 J	19 U	20 U	18 U
Acenaphthene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	310	1.9 U	5.6 J	1.9 U	1.9 U	2 U	6.1 J
Acenaphthylene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	3.4 J	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Anthracene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	580	1.9 U	13 J	1.9 U	1.9 U	2 U	15 J
Benzaldehyde	19 R	19 R	20 R	19 R	19 R	18 R	19 R	18 R	47 L	19 R	20 R	18 R
Benzo(a)anthracene	1.9 U	1.9 U	2 U	1.9 J	1.9 U	3,100	1.9 U	58	1.9 U	1.9 U	2 U	89
Benzo(a)pyrene	0.76 U	3.7 U	0.8 U	0.77 U	0.76 U	3,500	3.7 U	71	0.76 U	3.8 U	0.8 U	73
Benzo(b)fluoranthene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3,900	3.7 U	80	3.8 U	3.8 U	4 U	130
Benzo(g,h,i)perylene	1.9 U	1.9 U	2 U	1.2 J	1.9 U	800	1.9 U	29 J	1.9 U	1.9 U	2 U	48
Benzo(k)fluoranthene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	730	3.7 U	41	3.8 U	3.8 U	4 U	50
Carbazole	38 U	37 U	40 U	38 U	38 U	380	37 U	37 U	38 U	38 U	40 U	35 U
Chrysene	1.9 U	1.9 U	2 U	1.5 J	1.9 U	2,600	1.5 J	56	1.9 U	1.9 U	2 U	85
Dibenz(a,h)anthracene	0.76 U	3.7 U	0.8 U	0.77 U	0.76 U	230 J	3.7 U	5.4 J	0.76 U	3.8 U	0.8 U	6.9 J
Dibenzofuran	1.9 U	1.9 U	2 U	1.9 U	1.9 U	170	1.9 U	2.2 J	1.9 U	1.9 U	2 U	2.9 J
Dimethyl phthalate	3.8 U	3.7 U	4 U	2.3 J	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	2.4 J	3.5 U
Fluoranthene	1.2 J	1.1 J	2 U	3.1 J	1.9 U	4,800	2.7 J	97	1.9 U	1.9 U	2 U	140
Fluorene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	210	1.9 U	4.1 J	1.9 U	1.9 U	2 U	3.2 J
Indeno(1,2,3-cd)pyrene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	830	3.7 U	28 J	3.8 U	3.8 U	4 U	43
Naphthalene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	84	1.9 U	2.2 J	1.9 U	1.9 U	2 U	1.1 J
n-Nitroso-di-n-propylamine	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	49	3.8 U	4 U	3.5 U
Phenanthrene	1.2 J	1.1 J	2 U	1.9 J	1.2 J	3,500	2.3 J	57	1.9 U	1.9 U	2 U	79
Phenol	3.7 U	3.7 U	3.9 U	3.8 U	3.7 U	3.6 U	3.7 U	3.6 U	1.9 J	3.7 U	3.9 U	3.5 U
Pyrene	3.7 U	3.7 U	3.9 U	2.3 J	3.7 U	4,500	1.9 J	89	3.7 U	3.7 U	3.9 U	130
Pesticide/Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	15 U	14 U	15 U	7.2 J	15 U	260	14 U	23	15 U	15 U	15 U	18
Total Metals (MG/KG)												
Aluminum	8,000 J	10,000 J	2,400	7,100	1,600	6,400	2,100	6,900	1,700	15,000	1,700	4,400
Antimony	0.25	0.26	0.13 B	0.16	0.097 J	0.16	0.17	2.1	0.34	0.25	0.055 B	1
Arsenic	5.2	5.1	1.8	3.2	1.6	2.2	3.5	3.3	4.1	5.1	1.6	2.6
Barium	15 J	23 J	6.7	12	4.1	29	5.3	40	5.6	43	11	36
Beryllium	0.34	0.37	0.5	0.29	1.1	0.39	0.25	0.48	0.12	0.58	0.99	0.39
Cadmium	0.048 J	0.062	0.027 J	0.2	0.058	0.044 J	0.034 J	0.12	0.039 J	0.054	0.048 J	0.29

TABLE 6-1

Site 4 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S04-DP01			CBD-S04-DP02		CBD-S04-DP03		CBD-S04-DP04		CBD-S04-DP05		CBD-S04-SO06
Sample ID	CBD-S04-SS01-1012	CBD-S04-SS01P-1012	CBD-S04-SB01-1820	CBD-S04-SS02-1012	CBD-S04-SB02-1618	CBD-S04-SS03-1012	CBD-S04-SB03-1416	CBD-S04-SS04-1012	CBD-S04-SB04-1012	CBD-S04-SS05-1012	CBD-S04-SB05-1315	CBD-S04-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	18 - 20	0 - 0.5	16 - 18	0 - 0.5	14 - 16	0 - 0.5	10-12	0 - 0.5	13 - 15	0 - 0.5
Calcium	480	590	62	210	38 J	240	110	650	350	580	120	750
Chromium (hexavalent)	0.22 U	0.35 J	1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	16	15	9.1	11	7.5	7.8	12	10	7	20	6.5	9.4
Cobalt	0.96	1.2	2	1.4	1.7	2.8	0.75	2.7	0.58	4	0.65	2.1
Copper	6.3	6.4	1.5	4.6	1.1	3	1.4	13	1.9	6.4	0.83	14
Cyanide	0.056 U	0.056 U	0.06 U	0.057 U	0.057 U	0.055 U	0.056 U	0.055 U	0.062 J	0.056 U	0.059 U	0.026 J
Iron	17,000	17,000	4,200	11,000	3,500	8,200	6,300	10,000	4,800	21,000	5,000	7,600
Lead	16	11	2.6	8.6	2.2	5.8	1.7	59	1.7	8.8	1.9	53
Magnesium	940	1,100	540	790	360	590	500	700	490	1,400	480	490
Manganese	24	25	24	33	13	78	5.2	78	3.2	120	4.6	68
Mercury	0.018 J	0.022 J	0.017 U	0.0064 J	0.017 U	0.017 U	0.017 U	0.084	0.011 J	0.027 J	0.017 U	0.065
Nickel	1.8	2.6	2.5	2.9	0.98	4.2	1.9	5.4	0.99	7.7	1.1	5.5
Potassium	850	930	410	590	310	360	340	440	340	810	380	350
Selenium	0.41	0.39	0.12 B	0.25	0.13 B	0.24	0.18	0.38	0.14 B	0.32	0.1 U	0.22
Silver	0.08	0.052	0.033 J	0.033 J	0.03 J	0.037 J	0.038 J	0.94	0.029 J	0.045 J	0.026 J	0.49
Thallium	0.12	0.13	0.093	0.12	0.12	0.23	0.29	0.18	0.16	0.27	0.07	0.13
Vanadium	18	21	4.9	16	3.5	14	7.5	16	4.2	31	3.5	24
Zinc	15 B	23 B	13 B	19 B	23 B	22 B	18 B	66	13 B	32	7.2	96 B
Wet Chemistry												
pH (ph)	5.5	NA	NA	5.7	NA	5.8	NA	6.1	NA	5.2	NA	6.2
Total organic carbon (TOC) (mg/kg)	10,000	NA	NA	1,500	NA	3,300	NA	4,300	NA	2,400	NA	11,000

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE 6-2

Site 4 Groundwater Detected Analytical Results

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S04-DP02	CBD-S04-DP03
Sample ID	CBD-S04-GW02-1012	CBD-S04-GW03-1012
Sample Date	10/19/12	10/19/12
Chemical Name		
Volatile Organic Compounds (UG/L)		
No Detections		
Semivolatile Organic Compounds (UG/L)		
4-Methylphenol	0.5 U	0.16 L
Acenaphthene	0.032 J	0.05 UL
Acetophenone	0.2 J	0.15 L
Benzaldehyde	0.12 J	0.25 UL
Dibenzofuran	0.1 U	0.031 L
Diethylphthalate	1.9	0.082 B
Dimethyl phthalate	0.26 J	0.25 UL
Di-n-butylphthalate	0.73 J	0.5 UL
Fluoranthene	0.05 U	0.052 L
Isophorone	0.14 J	0.1 UL
Phenol	0.13 J	0.16 L
Pyrene	0.1 U	0.031 L
Pesticide/Polychlorinated Biphenyls (UG/L)		
No Detections		
Total Metals (UG/L)		
Aluminum	24 J	9,900
Arsenic	0.5 U	17
Barium	81	130
Beryllium	0.46 J	0.84 J
Cadmium	3.5	0.68
Calcium	3,800	9,500
Chromium	0.47 J	92
Cobalt	11	12
Copper	2.5 B	8.7
Iron	2,200	23,000
Lead	0.74 J	18
Magnesium	3,000	6,900
Manganese	130	220
Mercury	0.2	0.1 U
Nickel	16	27
Potassium	2,500	4,600
Silver	0.1 U	0.061 J
Sodium	14,000	8,700
Thallium	0.26 J	1.5
Vanadium	0.2 U	43
Zinc	55	99
Dissolved Metals (UG/L)		
Arsenic	0.21 J	0.19 J
Barium	76	46
Beryllium	0.54 J	0.4 U
Cadmium	3	0.69
Calcium	3,800	8,400
Chromium	0.44 J	0.79 J

TABLE 6-2

Site 4 Groundwater Detected Analytical Results

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S04-DP02	CBD-S04-DP03
Sample ID	CBD-S04-GW02-1012	CBD-S04-GW03-1012
Sample Date	10/19/12	10/19/12
Cobalt	11	7.4
Iron	2,100	190
Lead	0.65 J	0.5 U
Magnesium	3,100	4,000
Manganese	130	230
Mercury	0.19 J	0.1 U
Nickel	16	16
Potassium	2,300	2,100
Sodium	14,000	9,400
Thallium	0.25 J	0.19 J
Zinc	55	57

Notes:

B - Analyte not detected above the level reported in blanks

J - Analyte present. Value may or may not be accurate or precise

L - Analyte present. Value may be biased low. Value may be higher

MG/L - Milligrams per liter

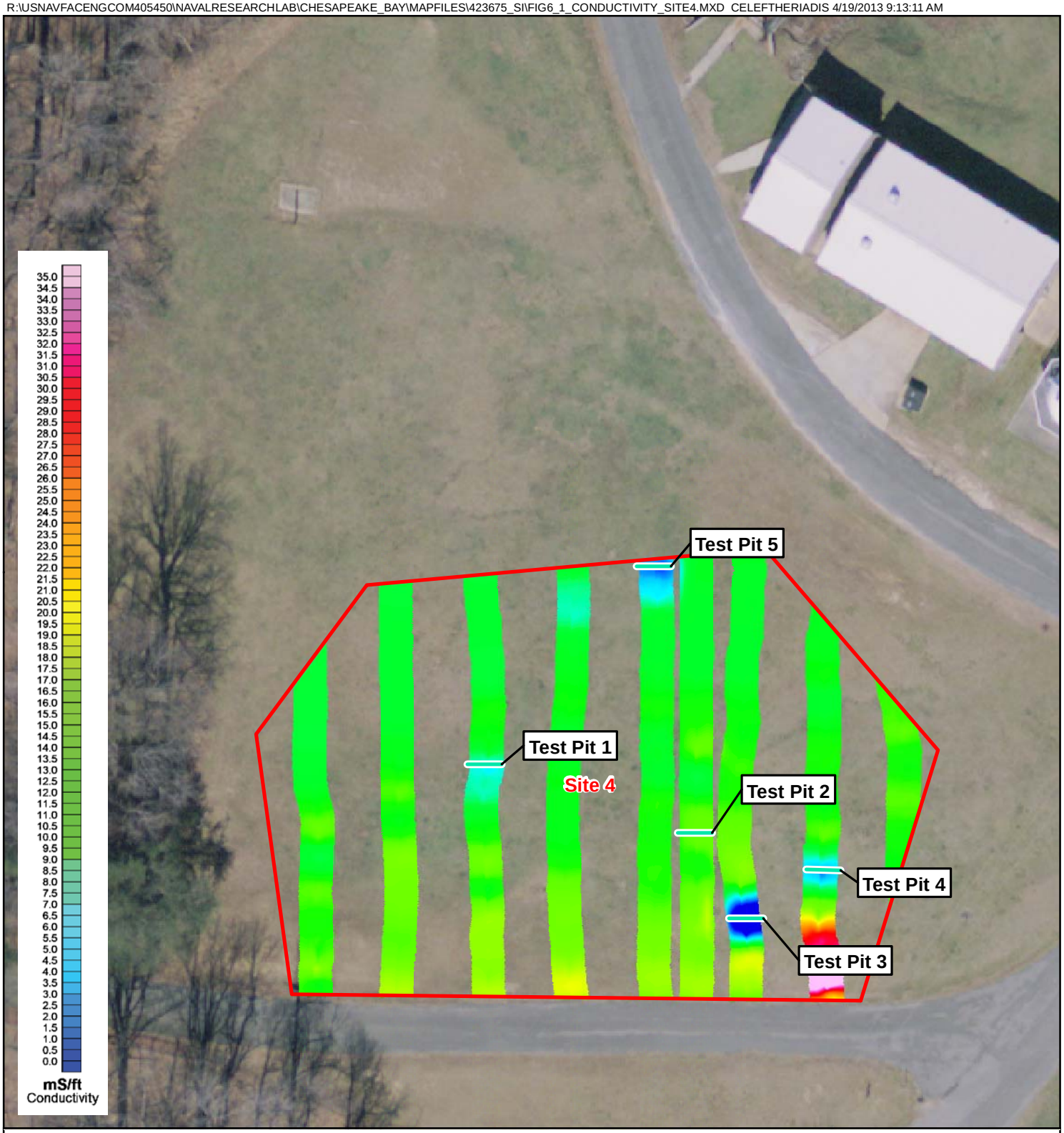
U - The material was analyzed for, but not detected

UG/L - Micrograms per liter

UL - Analyte not detected, quantitation limit is probably higher

Shading indicates detection

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG6_1_CONDUCTIVITY_SITE4.MXD CELEFTHERIADIS 4/19/2013 9:13:11 AM



Legend

- Test Pits
- IR Site Boundary

N

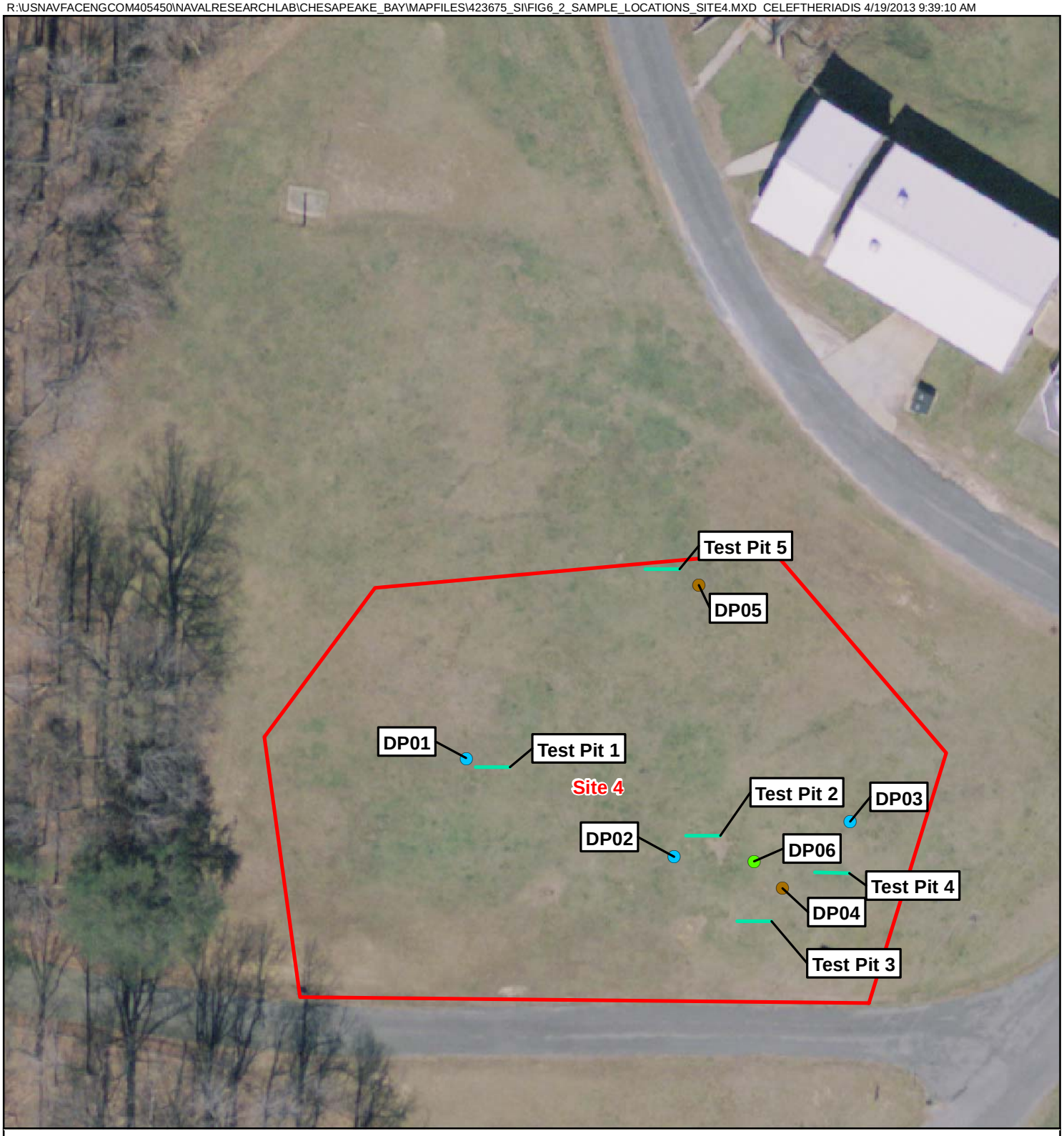
0 20 40 Feet

1 inch = 40 feet

Figure 6-1
Site 4 Test Pit Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

CH2MHILL

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG6_2_SAMPLE_LOCATIONS_SITE4.MXD CELEFTHERIADIS 4/19/2013 9:39:10 AM



Legend

- Co-located Surface Soil and Subsurface Soil Location
- Co-located Surface Soil, Subsurface Soil and Groundwater Location
- Surface Soil Location
- Test Pits
- IR Site Boundary

N

0 20 40 Feet

1 inch = 40 feet

Figure 6-2
Site 4 Sample Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

CH2MHILL

SECTION 7

Site 5 - Landfill No. 3

7.1 Site Description

Site 5, also known as Landfill No. 3 or "New Junk Row," is located on the western portion of NRL-CBD (**Figure 7-1**). Landfill No. 3 was operational from 1958 through 1968. Similar to Sites 3 and 4, the IAS stated that the site consisted of four to six pits (25 feet by 25 feet by 20 feet deep) and occupied an area of 3,750 ft^2. However, an aerial photograph dated May 1964 shows ground disturbance in an area that is 56,114 ft^2 in size. In addition to the landfill pits, the IAS states that two burn pits were located onsite as well. After the land-filling operations were complete, the site was designated as "New Junk Row" and used for the open storage of assorted debris consisting of rusted laboratory equipment, heavy equipment, and missile packing crates. During a site visit conducted during the IAS, two empty drums with no labels were observed and areas where open burning took place were noted to have oil-stained soil patches and were devoid of grass cover (NEESA, 1984). Currently, the site is largely wooded with a grass clearing where the former access road used to be located and is relatively flat with an approximate maximum elevation of 155 feet amsl.

7.2 Investigation Summary

7.2.1 Digital Geophysical Mapping Survey

A DGM survey was completed along 11 transects located across Site 5. During the historical records search a suspected former disposal and/or burn pit was identified (denoted by the orange box shown on Figures 9 and 10 in Appendix A). The EM31 transects were intentionally spaced closer together at this location because of this suspected disposal area. The EM31 data identified a conductivity anomaly in the southern portion of the orange box (Appendix A, Figure 9), as well as to the north of the orange box on Transect 61. Subtle variations in the EM31 inphase response (Appendix A, Figure 10) were identified in these locations, although they did not appear to be significant. The anomalies within and immediately to the north of the orange box on Figures 9 and 10 in Appendix A appeared to represent primarily non-metallic debris or features.

Anomalies were depicted on both the EM31 conductivity and inphase components on transects 41 and 51 (Appendix A, Figures 9 and 10). Therefore, it appeared likely that these anomalies were associated with metal. The inphase response was relatively strong, indicating either an increased amount of metal or metal buried relatively shallow. The EM31 anomaly on Transect 41 was located near a break in the transect that was the result of inaccessible conditions due to a brush pile. It is possible that the EM31 anomaly identified on Transect 41 is the result of metal scrap mixed in with the brush at the surface.

Anomalies depicted on Transects 53 and 55A correspond to the EM31 conductivity data. There is no corresponding inphase response anomaly at these locations, thereby indicating that the anomalies were likely associated with non-metallic debris or features.

7.2.2 Test Pitting

Six test pit locations (**Figure 7-2**) were advanced at Site 5. One location was selected on each of the following transects: 41, 51, 53, and 55A. Two test pit locations were advanced on Transect 61: one inside the orange box demarcating the suspected disposal and/or burn pit and one just to the north of the orange box at an identified anomaly location. The complete test pit logs are located in Appendix B. A brief summary of the results for each test pit are provided as follows:

- **Test Pit 1 (Transect 41A)** – The test pit was dug to a depth of 9 feet bgs. The test pit was terminated one foot short of the work plan design by the CH2M field geologist based on a lack of evidence showing waste materials. Soils encountered were described as consisting of sandy clay. No signs of waste material or soil staining were encountered in this test pit.

- **Test Pit 2 (Transect 55A)** - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of sandy clay. No signs of waste material or soil staining were encountered in this test pit with the exception of a plastic sheet encountered at 2 feet bgs.
- **Test Pit 3 (Transect 61 near suspected disposal pit)** - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of sandy clay. Waste was encountered from 8 to 10 feet and consisted of metal and burned materials. No signs of soil staining were observed on the test pit sidewalls or floor.
- **Test Pit 4 (Transect 61 north of suspected disposal pit)** - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of silty sand. Waste was encountered from 1.5 feet to 3 feet bgs and consisted of glass and metal. No signs of soil staining were observed in this depth interval. No signs of waste material or soil staining were encountered from 3 feet to 10 feet bgs.
- **Test Pit 5 (Transect 51)** - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of clayey sand. No signs of waste material or soil staining were encountered in the test pit.
- **Test Pit 6 (Transect 53)** - The test pit was dug to a depth of 10 feet bgs. Soils encountered were described as consisting of well-graded gravel and sand from approximately ground surface to 3 feet bgs and sandy clay from 3 feet to 10 feet bgs. No signs of waste material or soil staining were encountered in the test pit.

7.2.3 Soil Sampling

Based on the evidence indicating that land-filling activities occurred at the site, co-located surface and subsurface soil samples were collected from five DPT sampling locations (DP01 through DP05) that were spatially distributed adjacent to test pits 3 and 4 (**Figure 7-1**). An additional surface soil sample was collected adjacent to test pit 4. Soil borings were advanced to a maximum depth of 24 feet bgs. Soil boring logs for each location are presented in Appendix C. Waste materials were not encountered in any of the soil borings with the exception of location DP03, in which waste materials were encountered from approximately 6 feet to 11 feet bgs and again from approximately 16 to 16.5 feet bgs. Surface soil samples were collected from a depth of 0 to 6 inches bgs, while subsurface soil samples were collected from a depth ranging from 18 feet to 22 feet bgs. All samples were analyzed in accordance with the UFP-SAP.

7.2.4 Groundwater Sampling

Three temporary wells were installed at locations DP01, DP02, and DP04. The temporary wells were screened between 14 and 24 feet bgs. However, groundwater samples were unable to be collected from any of the locations due to the lack of available groundwater.

7.3 Analytical Results

A summary of the constituents detected in soil are presented in **Table 7-1**. Data tables with the complete analytical results for Site 5 are located in Appendix D. The soil analytical data were evaluated with respect to potential human health receptors (Section 7.4) and ecological receptors (Section 7.5). The constituents detected in soil at Site 5 are discussed as follows.

7.3.1 Surface Soil Analytical Results

A total of six surface soil samples were collected at Site 5 during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

VOCs – Five VOCs (acetone, benzene, methyl acetate, toluene, and Freon-11) were detected in surface soil samples at Site 5. Acetone and toluene were detected in all surface soil samples, while benzene, methyl acetate, and Freon-11 were detected in one location each.

SVOCs – Twenty-one SVOCs (2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, butylbenzlphthalate, carbazole, chrysene, dibenz[a,h]anthracene, dibenzofuran, dimethyl phthalate,

fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene) were detected in surface soil samples. One or more detections were found at all surface soil locations with the highest concentrations located at DP03 and the second highest concentrations at DP06, which were located near the suspected disposal and/or burn pit.

Pesticides and PCBs – Two PCBs, Aroclor-1254 and Aroclor-1260, were detected in surface soil samples. One or more detections were found at all sample locations except DP02 and DP05.

Metals – Twenty-five metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in surface soil samples. One or more detections were found at all sample locations.

Wet Chemistry (pH and TOC) – pH ranged from 4.9 to 6.2, while TOC ranged from 2,700 mg/kg to 16,000 mg/kg.

7.3.2 Subsurface Soil Analytical Results

A total of five subsurface soil samples were collected at Site 5 during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

VOCs – Eleven VOCs (2-butanone, acetone benzene, ethylbenzene, isopropylbenzene, m- and p-xylene, methyl acetate, methylcyclohexane, o-xylene, toluene, and Freon-11) were detected in subsurface soil samples. The majority of the detections were associated with the sample collected from DP03.

SVOCs – Fourteen SVOCs (acenaphthene, acenaphthylene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzofuran, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene) were detected in subsurface soil. The majority of the detections were associated with the sample collected from DP03.

Pesticides and PCBs – No pesticides or PCBs were detected in any of the subsurface soil samples.

Metals – Twenty-two metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in subsurface soil samples. Multiple detections were found at all sample locations.

7.4 Human Health Risk Screening

The HHRS for Site 5 was conducted in three steps using the risk-ratio technique (Navy, 2000) described in detail in Section 3.4. Results were reported for both the Navy and the MDE target risk levels. An overview of the various potential receptors and exposure pathways addressed in the HHRS is discussed in Section 3.4.1. The supporting tables for the evaluation are presented in Appendix E.4.

Surface Soil

The risk-based screening and risk-ratio evaluation for surface soil at Site 5 are provided in Appendix E.4, Tables 2.1 through 2.1b.

Step 1: Eight constituents were identified as COPCs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and cobalt.

Step 2: Cumulative cancer risk of 7×10^{-4}; this value is greater than the 5×10^{-5} Navy risk-ratio screening benchmark and the MDE target risk level. The target organ HI was 0.3; less than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. Constituents contributing to the cumulative cancer risk were identified as COPCs and include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

Step 3: Cumulative cancer risk of 7×10^{-4}; this value is greater than the 5×10^{-5} Navy risk-ratio screening benchmark and the 1×10^{-5} MDE target risk level. Constituents contributing to the cumulative cancer risk were

identified as COPCs and included: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

No screening criteria were available for carbazole and dimethyl phthalate. Therefore, potential risks could not be evaluated for these constituents.

Of the constituents that were 100 percent non-detected, a few SVOCs exceeded their respective RSL. Screening criteria were not available for several constituents.

Exposure to surface soil at Site 5 may result in unacceptable human health risks primarily associated with PAHs.

Subsurface Soil

The risk-based screening and risk-ratio evaluation for subsurface soil at Site 5 are provided in Appendix E.4, Tables 2.2 and 2.2a.

Step 1: One constituent was identified as a COPC: cobalt.

Step 2: Cumulative cancer risk of 3×10^{-7}; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the 1×10^{-5} MDE target risk level. The target organ HI was 5; greater than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. The only constituent contributing to a cumulative target organ HI greater than 0.5 and identified as a COPC was cobalt.

Step 3: Cumulative target organ HI calculated for the COPC was 5. The only constituent contributing to a cumulative target organ HI greater than 0.5 (and 1) and identified as a COPC was cobalt.

No screening criteria were available for dimethyl phthalate. Therefore, potential risks could not be evaluated for this constituent.

Of the constituents that were 100 percent non-detected, a few VOCs and SVOCs exceeded their respective RSL. Screening criteria were not available for several constituents.

Based on the results of the human health screening, exposure to subsurface soil at Site 5 may result in unacceptable human health risks associated with cobalt.

7.5 Ecological Risk Screening

The ERA for surface soil at Site 5 was conducted using the risk-ratio technique (CNO, 1999) described in detail in Section 3.5. An overview of the various potential receptors and exposure pathways addressed in the ERA is discussed in Section 3.5.2. The supporting tables for the evaluation are presented in Appendix F.

Of the detected analytes, one VOC (methyl acetate), 19 SVOCs (acenaphthene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, carbazole, chrysene, dibenz[a,h]anthracene, dibenzofuran, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, pyrene, low molecular weight PAHs, and high molecular weight PAHs), and nine metals (aluminum, chromium, copper, cyanide, iron, lead, mercury, thallium, and vanadium) were retained as COPCs (Appendix F, Table 5).

The following constituents had an HQ greater than 1 and were retained for further evaluation: acenaphthene (HQ=26), anthracene (HQ=64), benzo(a)anthracene (HQ=300), benzo(a)pyrene (HQ=37), benzo(b)fluoranthene (HQ=320), benzo(g,h,i)perylene (HQ=130), benzo(k)fluoranthene (HQ=110), chrysene (HQ=260), dibenz(a,h)anthracene (HQ=4.2), fluoranthene (HQ=450), fluorene (HQ=21), indeno(1,2,3-cd)pyrene (HQ=130), naphthalene (HQ=15), phenanthrene (HQ=270), pyrene (HQ=480), low molecular weight PAHs (HQ=2.93), high molecular weight PAHs (HQ=161), chromium (HQ=2,400), copper (HQ=3.29), cyanide (HQ=13), lead (HQ=1.17), mercury (HQ=1.9), thallium (HQ=130), and vanadium (HQ=80). The constituents methyl acetate, carbazole, dibenzofuran, aluminum, and iron were also retained because an ESV was not available.

Maximum-detected concentrations of inorganic chemicals in Site 5 surface soils are compared to the 95% UTLs for Soil Grouping 2 sites (Appendix F, Table 10). Of the COPCs identified in Site 5 surface soils, the detected

concentrations of the copper and lead exceeded the background 95% UTL value for Background Soil Group 2 sites and are considered to be site-related.

Exposure to surface soil at Site 5 may result in unacceptable ecological risk associated with acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorine, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, low molecular weight PAHs, high molecular weight PAHs, copper and lead.

7.6 Findings and Recommendations

7.6.1 Findings

Based upon the observations of the fieldwork (DGM survey, test pitting and DPT sampling), evidence of waste material was encountered in several locations. The DGM survey identified six areas of interest where test pits were excavated. Waste material was encountered in two of the six test pits with the depth waste was first encountered ranging from 2 to 8 feet bgs. The two test pits where waste was encountered roughly corresponded to the area identified as a disposal pit from the historical documentation. Since the two test pits where waste material was encountered are relatively close to each other, it is not possible to determine if the waste material is from individual pits as presented in the IAS or if the waste material was from one larger disposal pit. No other signs of waste material placement such as soil staining or odors were observed in any of the DPT soil borings, with the exception of location DP03.

Based on the results of the analytical data, VOCs, SVOCs, PCBs, and metals were detected in surface soil at Site 5, while VOCs, SVOCs, and metals were detected in subsurface soil. While groundwater samples were unable to be collected from the site due to a lack of available water, groundwater is not considered require further evaluation for the following reasons:

- Groundwater was not encountered within 24 feet of the ground surface at the site.
- Based on the description of the disposal pits, they had a maximum depth of 20 feet bgs and it is unlikely the groundwater may have contacted the waste material.
- Only cobalt was identified as a COPC for subsurface soil
- Based on the HHRS and ERA, the constituents presented in the following table may present potentially unacceptable risk and were retained as COPCs for Site 5.

Media	COPCs	
	Human Health	Ecological
Surface Soil	benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene	Methyl acetate, acenaphthene, anthracene, benzo(a) anthracene, benzo(a)pyrene, benzo(b)fluorathene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, copper, lead
Subsurface Soil	cobalt	N/A

7.6.2 Risk Considerations

Human Health

While cobalt was retained as a COPC for subsurface soil, the following considerations should be made regarding further evaluation for cobalt:

- The non-cancer toxicity value (reference dose [RfD]) used to derive the RSL for cobalt is not a Tier 1 value (from the USEPA Integrated Risk Information System), but is a Tier 2 value. The Tier 2 value is from the Provisional Peer Reviewed Toxicity Values (PPTVs) database. The PPTV value was adjusted based on a re-review of data in the PPTV database in 2008 and decreased 2 orders of magnitude. The value is now derived

using the highest level of modifying and uncertainty factors (3,000, when previously it had been 10). This value change implies there is very low confidence in the RfD (non-cancer toxicity value used to derive the RSL).

Ecological

As discussed in Section 3.5.4.3 of the ERS, methyl acetate, carbazole, and dibenzofuran were retained as COPCs because ESVs did not exist for these chemicals. However, these chemicals do not warrant further evaluation since there is uncertainty associated with their risk because their risk cannot be definitively determined.

7.6.3 Recommendations

Site 5 is recommended for further evaluation based upon potential unacceptable human health and ecological risks associated with acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene , indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, copper and lead in surface soil. Based on the distribution of detected results at Site 5, any future evaluation of the site should focus on the suspected disposal and/or burn pit surrounding location DP03, as this location generated the majority of the analytical detections and is spatially situated in the middle of the suspected disposal and/or burn pit.

TABLE 7-1

Site 5 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S05-DP01				CBD-S05-DP02		CBD-S05-DP03		CBD-S05-DP04	
Sample ID	CBD-S05-SS01-1012	CBD-S05-SS01P-1012	CBD-S05-SB01-2022	CBD-S05-SB01P-2022	CBD-S05-SS02-1012	CBD-S05-SB02-2022	CBD-S05-SS03-1012	CBD-S05-SB03-1820	CBD-S05-SS04-1012	CBD-S05-SB04-2022
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/19/12	10/19/12	10/18/12	10/18/12	10/19/12	10/19/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	20 - 22	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	20 - 22
Chemical Name										
Volatile Organic Compounds (UG/KG)										
2-Butanone	5.4 B	0.44 U	0.6 U	0.52 U	9.9 B	0.5 U	4.4 B	210 J	2.9 B	1.9 B
Acetone	98	20	6 U	5.2 U	400 J	16	160	430 J	110	19
Benzene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.2 J
Ethylbenzene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	310	0.54 U	0.51 U
Isopropylbenzene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	2,600	0.27 U	0.25 U
m- and p-Xylene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	390	0.54 U	0.51 U
Methyl acetate	1.7 B	1 B	1.9 B	1 B	NA	1.6 B	1.8 B	1,300	2.9 B	2 J
Methylcyclohexane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	160 J	0.54 U	0.51 U
o-Xylene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	650	0.27 U	0.25 U
Toluene	0.78 J	0.31 J	0.6 U	0.52 U	1.3 J	0.5 U	0.24 J	29 U	0.71 J	0.75 J
Trichlorofluoromethane (Freon-11)	0.23 U	0.22 U	0.3 U	0.26 U	0.26 J	0.25 U	0.3 U	58 U	0.27 U	0.25 U
Semivolatile Organic Compounds (UG/KG)										
1,1-Biphenyl	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	45	18 U	20 U
2-Methylnaphthalene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	330 J	720	1.8 U	2 U
Acenaphthene	1.7 J	1.7 U	2 U	2 U	1.8 U	2 U	2,600	93	1.8 U	2 U
Acenaphthylene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U
Anthracene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	6,400	2.4 J	1.8 U	2 U
Benzo(a)anthracene	2.8 J	5.2 J	2 U	2 U	1.8 U	2 U	30,000	5.6 J	4.8 J	2 U
Benzo(a)pyrene	3.6 U	5.2 J	4 U	0.79 U	3.5 U	0.79 U	3,700	7.8 U	18	0.79 U
Benzo(b)fluoranthene	4.5 J	6.6 J	4 U	3.9 U	3.5 U	3.9 U	32,000	10 J	6.6 J	3.9 U
Benzo(g,h,i)perylene	2.4 J	3.1 J	2 U	2 U	1.8 U	2 U	13,000	13 J	2.9 J	2 U
Benzo(k)fluoranthene	2.4 J	3.8 J	4 U	3.9 U	3.5 U	3.9 U	11,000	4 J	3.3 J	3.9 U
Butylbenzylphthalate	3.6 UJ	61 J	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U
Carbazole	36 U	34 U	40 U	39 U	35 U	39 U	3,100 J	39 U	36 U	39 U
Chrysene	2.8 J	4.9 J	2 U	2 U	1.8 U	2 U	26,000	5.2 J	5.1 J	2 U
Dibenz(a,h)anthracene	3.6 U	3.4 U	4 U	0.79 U	3.5 U	0.79 U	420 J	7.8 U	3.6 U	0.79 U
Dibenzofuran	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	1,200	59	1.8 U	2 U
Dimethyl phthalate	3.6 U	3.4 U	2.3 J	3.9 U	3.5 U	3.9 U	200 U	3.9 U	2.6 J	3.9 U
Fluoranthene	4.2 J	7.3 J	2 U	2 U	1 J	2 U	45,000	4.4 J	6.3 J	2 U
Fluorene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	2,100	25	1.8 U	2 U
Indeno(1,2,3-cd)pyrene	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	13,000	6.8 J	3.6 U	3.9 U
Naphthalene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	1,500	82	1.8 U	2 U
Phenanthrene	2.8 J	4.5 J	1.2 J	2 U	1.8 U	2 U	27,000	13 J	4 J	2 U
Pyrene	4.9 J	7.3 J	4 U	3.9 U	3.5 U	3.9 U	48,000	13 J	7.4 J	3.9 U
Pesticide/Polychlorinated Biphenyls (UG/KG)										
Aroclor-1254	9.1 J	13 U	16 U	15 U	14 U	15 U	46	15 U	14 U	15 U
Aroclor-1260	14 U	8.2 J	16 U	15 U	14 U	15 U	80	15 U	5.6 J	15 U
Total Metals (MG/KG)										
Aluminum	5,600 J	4,400 J	2,500	2,300	2,700	4,400	7,400	1,800	6,300	7,000
Antimony	0.16	0.13 B	0.13 B	0.16	0.09 J	0.13	2.4	0.33	0.81	0.32

TABLE 7-1

Site 5 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S05-DP01				CBD-S05-DP02		CBD-S05-DP03		CBD-S05-DP04	
Sample ID	CBD-S05-SS01-1012	CBD-S05-SS01P-1012	CBD-S05-SB01-2022	CBD-S05-SB01P-2022	CBD-S05-SS02-1012	CBD-S05-SB02-2022	CBD-S05-SS03-1012	CBD-S05-SB03-1820	CBD-S05-SS04-1012	CBD-S05-SB04-2022
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/19/12	10/19/12	10/18/12	10/18/12	10/19/12	10/19/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	20 - 22	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	20 - 22
Arsenic	2.3	1.6	2.6	2.6	0.91	2.6	5.1	3.7	2.8	4.4
Barium	20	16	6.7	7.1	9.7	8.7	39	5.8	25	9.4
Beryllium	0.33	0.23	2.1	1.8	0.19	2.7	0.41	2.7	0.37	3.6
Cadmium	0.067	0.093	0.26	0.21	0.053	0.26	0.44	0.19	0.2	0.46
Calcium	140 J	460 J	360	300	250	340	2,500	410	1,100	88
Chromium (hexavalent)	0.17 J	0.21 U	0.25 U	0.27 U	NA	NA	NA	NA	NA	NA
Chromium	9.9	6.2	8.4	8.2	4.8	9	18	7.6	17	7.4
Cobalt	2.1	1.1	2.9	2.6	0.83	3.9	2.1	9.8	1.7	110
Copper	5	5	1.1	1.2	1.9	1.3	230	5.6	17	1.5
Cyanide	0.054 U	0.036 J	0.06 U	0.059 U	0.036 J	0.059 U	0.065 J	0.058 U	0.032 J	0.059 U
Iron	8,000 J	6,100 J	3,800	3,400	3,200	4,500	14,000	4,300	10,000 B	5,100
Lead	8.7	8	2.1	2	4.1	1.8	140	3.4	25	1.6
Magnesium	550	450	740	660	330	860	1,300	630	1,000	560
Manganese	39	42	13 J	8.5 J	26	12	65	46	47	290
Mercury	0.017 U	0.011 J	0.017 U	0.016 U	0.0066 J	0.016 U	0.11	0.017 U	0.059	0.017 U
Nickel	3.5	3	4.8	4.4	1.8	11	10	13	4.6	32
Potassium	430	370	480	420	250	530	1,000	410	760	380
Selenium	0.26	0.16 B	0.3	0.4	0.17	0.53	0.38	0.26	0.33	0.86
Silver	0.052	0.15	0.027 J	0.028 J	0.17	0.028 J	0.3	0.29	0.49	0.024 J
Sodium	11 B	9 B	31 J	26 J	9.4 B	55 B	28 B	12 B	22 J	44 B
Thallium	0.11	0.076	0.21	0.19	0.052	0.18	0.13	0.15	0.12	0.31
Vanadium	15	9.2	4.6	5	6.3	7.8	40	4.8	18	11
Zinc	19 B	18 B	68	78	12 B	80 B	200 B	110 B	52 B	130 B
Wet Chemistry										
pH (ph)	5.5	NA	NA	NA	5.7	NA	6.2	NA	5.6	NA
Total organic carbon (TOC) (mg/kg)	2,700	NA	NA	NA	5,300	NA	14,000	NA	7,200	NA

, , 01/00/1900

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE 7-1

Site 5 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S05-DP05		CBD-S05-SO06
Sample ID	CBD-S05-SS05-1012	CBD-S05-SB05-2022	CBD-S05-SS06-1012
Sample Date	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	0 - 0.5	20 - 22	0 - 0.5
Chemical Name			
Volatile Organic Compounds (UG/KG)			
2-Butanone	4.7 B	0.52 U	6.9 B
Acetone	140	28	160
Benzene	0.67 U	0.52 U	0.32 J
Ethylbenzene	0.67 U	0.52 U	0.64 U
Isopropylbenzene	0.33 U	0.26 U	0.32 U
m- and p-Xylene	0.67 U	0.52 U	0.64 U
Methyl acetate	31	2.4 B	2.8 B
Methylcyclohexane	0.67 U	0.52 U	0.64 U
o-Xylene	0.33 U	0.26 U	0.32 U
Toluene	1.8 J	0.52 U	0.46 J
Trichlorofluoromethane (Freon-11)	0.33 U	0.43 J	0.32 U
Semivolatile Organic Compounds (UG/KG)			
1,1-Biphenyl	25 U	20 U	21 U
2-Methylnaphthalene	2.5 U	2 U	13 J
Acenaphthene	2.5 U	2 U	70
Acenaphthylene	2.5 U	2 U	1.3 J
Anthracene	2.5 U	2 U	120
Benzo(a)anthracene	6.4 J	2 U	290
Benzo(a)pyrene	250	0.8 U	200
Benzo(b)fluoranthene	12 J	4 U	370
Benzo(g,h,i)perylene	5.4 J	2 U	110
Benzo(k)fluoranthene	6.4 J	4 U	150
Butylbenzylphthalate	4.9 U	4 U	4.3 U
Carbazole	49 U	40 U	64 J
Chrysene	6.9 J	2 U	260
Dibenz(a,h)anthracene	25	0.8 U	26
Dibenzofuran	2.5 U	2 U	39
Dimethyl phthalate	4.9 U	4 U	4.3 U
Fluoranthene	6.9 J	2 U	430
Fluorene	2.5 U	2 U	60
Indeno(1,2,3-cd)pyrene	4.9 J	4 U	110
Naphthalene	2.5 U	2 U	27
Phenanthrene	3.5 J	2 U	510
Pyrene	10 J	4 U	550
Pesticide/Polychlorinated Biphenyls (UG/KG)			
Aroclor-1254	19 U	16 U	32
Aroclor-1260	19 U	16 U	37
Total Metals (MG/KG)			
Aluminum	2,300	1,800	6,700
Antimony	0.066 J	0.18	2

TABLE 7-1

Site 5 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S05-DP05		CBD-S05-SO06
Sample ID	CBD-S05-SS05-1012	CBD-S05-SB05-2022	CBD-S05-SS06-1012
Sample Date	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	0 - 0.5	20 - 22	0 - 0.5
Arsenic	0.94	3.4	3.6
Barium	6	4.3	26
Beryllium	0.15	2.7	1.4
Cadmium	0.033 J	0.3	0.39
Calcium	25 J	450	1,300
Chromium (hexavalent)	NA	NA	NA
Chromium	4.8	8.2	14
Cobalt	0.7	5.4	6.9
Copper	2	1	72
Cyanide	0.034 J	0.06 U	0.064 U
Iron	2,600	4,300	12,000
Lead	4.2	1.7	60
Magnesium	220	660	950
Manganese	13	21	100
Mercury	0.017 U	0.017 U	0.078
Nickel	1.4	20	15
Potassium	220	450	800
Selenium	0.1	0.071 J	0.47
Silver	0.076	0.023 J	0.68
Sodium	16 B	14 B	28 B
Thallium	0.045 J	0.14	0.11
Vanadium	6.5	4.6	35
Zinc	5.9	57 B	96 B
Wet Chemistry			
pH (ph)	4.9	NA	5.6
Total organic carbon (TOC) (mg/kg)	5,000	NA	16,000

, , 01/00/1900

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

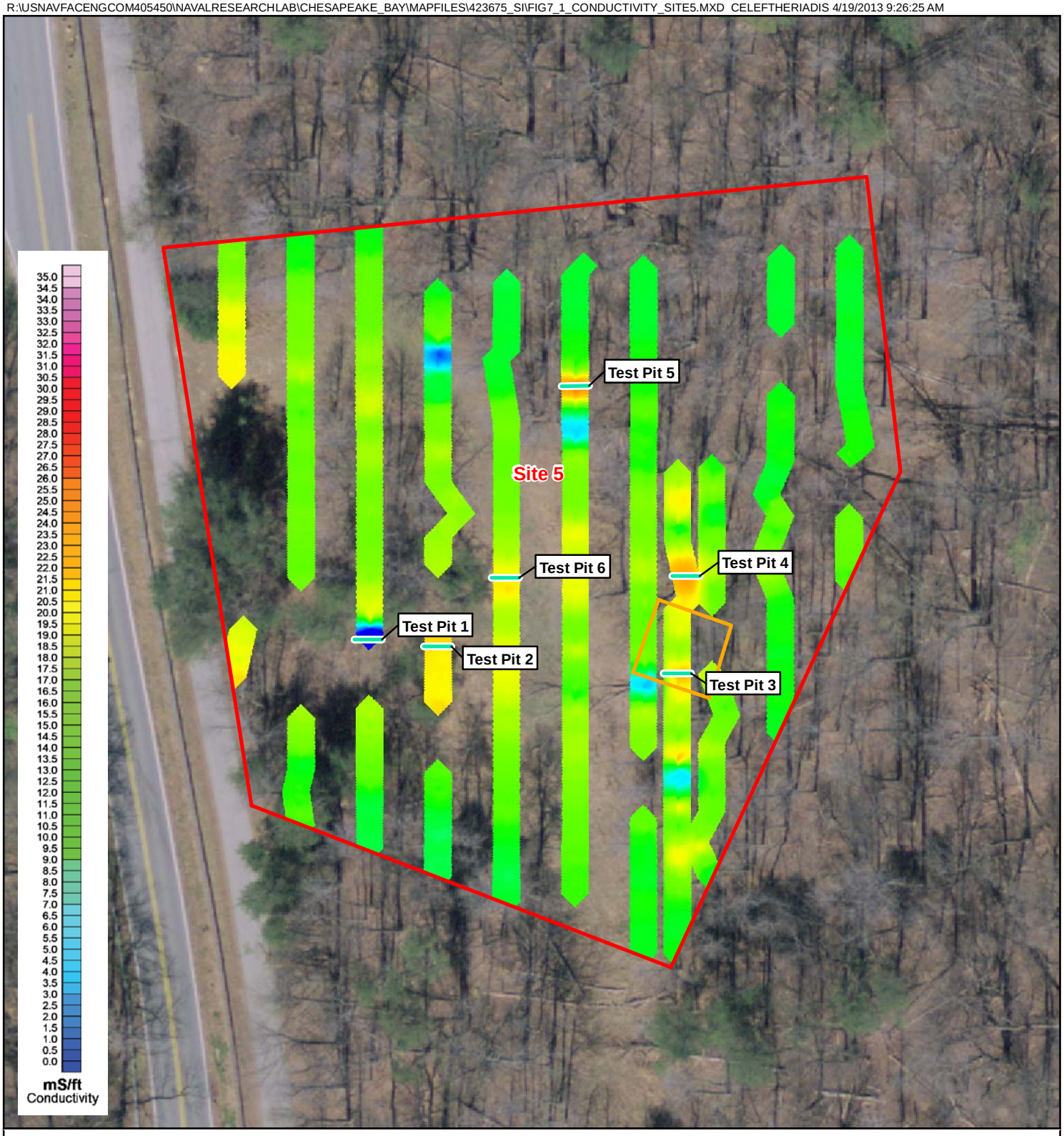
UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG7_1_CONDUCTIVITY_SITE5.MXD CELEFTHERIADIS 4/19/2013 9:26:25 AM



Legend

- Test Pits
- Suspected Disposal and/or Burn Pit
- Site Boundary

N

0 25 50

Feet

1 inch = 50 feet

Figure 7-1
Site 5 Test Pit Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

CH2MHILL

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG7_2_SAMPLE_LOCATIONS_SITE5.MXD CELEFTHERIADIS 4/19/2013 9:21:18 AM



Legend

- Co-located Surface Soil and Subsurface Soil Location
- Surface Soil Location
- Test Pits
- Suspected Disposal and/or Burn Pit
- Site Boundary

N

0 25 50

Feet

1 inch = 50 feet

Figure 7-2
Site 5 Sample Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

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SECTION 8

Site 7 - Road Oil Application

8.1 Site Description

Site 7, also known as "Road Oil Application," encompasses the historical dirt roads located on the portion of NRL-CBD located west of Bayside Road (**Figure 8-1**). From 1940 through 1952, waste oils were reportedly spread twice a year on dirt roads located on NRL-CBD west of Maryland State Route 261 for use as dust-control measures during dry periods (NEESA, 1984). The oil used in this application was primarily spent crankcase oil and paint thinner. Other liquid waste products such as engine cleaner, steam cleaning waste, dishwashing soap, and gasoline were also mixed in with the waste oil (NEESA, 1984). It was reported, but not confirmed, that a small volume (less than 10 pints per year) of PCB-contaminated liquids may have also been mixed with the waste oils (NEESA, 1984). Approximately one to two 55-gallon drums per year of spent oil was sprayed onto the road surfaces during this process. Today the former dirt roads either no longer exist or they have been improved with asphalt and are used as the current base access roads.

8.2 Investigation Summary

8.2.1 Soil Sampling

The Site 7 soil investigation was divided into two study areas, the Unpaved Study Area and the Paved Study Area, based upon how the former dirt road network currently exists. The former dirt roads, which no longer exist, were identified as the Unpaved Study Area while the former dirt road, which has been improved and is currently used, was identified as the Paved Study Area. The details of the soil investigation for each study area are provided as follows.

Unpaved Study Area

In order to better locate the former roads in the Unpaved Study Area, as they no longer exist, a series of three transects (Transect 1, Transect 2, and Transect 3 [**Figure 8-1**]) were established running perpendicular to the direction of the former road. Along each transect a series of nine DPT borings (T1-1 through T1-9, T2-1 through T2-9, and T3-1 through T3-9, respectively [**Figure 8-1**]), spaced 5 feet apart, were advanced to a depth of 8 feet bgs in an effort to locate the former road. Based on the results of these borings, three locations were selected for analytical sampling based on signs of contamination or in cases where potential contamination was not observed the locations centered on the historical road were selected.

Transect 1 - Signs of contamination (odors and soil staining) were present in DPT borings T1-5, T1-6, and T1-8. These locations were selected for analytical sampling and renumbered to DP01 (T1-5), DP02 (T1-6), and DP03 (T1-8), respectively. Surface soil samples, collected from 0 to 6 inches bgs, as well as subsurface soil samples, collected from depths ranging from 5 to 8 feet bgs, were collected at each location.

Transect 2 - No signs of contamination were present in any of the DPT borings located along Transect 2 (such as elevated PID readings, soil staining, and so forth). In accordance with the SAP, the DPT location centered on the former road (T2-5) and the next closest location to the north (T2-4) and the south (T2-6) were selected for analytical sampling. These stations were renumbered to DP04 (T2-4), DP05 (T2-5), and DP06 (T2-6), respectively. Surface soil samples, collected from 0 to 6 inches bgs, as well as subsurface soil samples, collected from depths ranging from 6 to 8 feet bgs, were collected at each location.

Transect 3 - No signs of contamination were present in any of the DPT borings located along Transect 3 (such as elevated PID readings, soil staining, and so forth). In accordance with the SAP, the DPT location centered on the former road (T3-5) and the next closest location to the north (T3-4) and the south (T3-6) were selected for analytical sampling. These stations were renumbered to DP07 (T3-4), DP08 (T3-5), and DP09 (T3-6), respectively. Surface soil samples, collected from 0 to 6 inches bgs, as well as subsurface soil samples, collected from depths ranging from 6 to 8 feet bgs, were collected at each location.

Paved Study Area

A series of 10 soil borings (DP10 through DP19) were advanced to a depth of 4 feet bgs along the current road (**Figure 8-1**). No signs of contamination (soil staining or odors) were found in any of the borings. In accordance with the UFP-SAP, one subsurface soil sample was collected from 2 to 4 feet bgs at each location.

8.3 Analytical Results

A summary of the constituents detected in soil are presented in **Table 8-1**. Data tables with the complete analytical results for Site 7 are located in Appendix D. The soil analytical data were evaluated with respect to potential human health receptors (Section 8.4) and ecological receptors (Section 8.5). The constituents detected in soil at Site 7 are discussed as follows.

8.3.1 Surface Soil Analytical Results

A total of nine surface soil samples were collected at Site7 during the October 2012 field event. The results of the surface soil sampling are summarized as follows:

- **VOCs** – Seven VOCs (2-butanone, 2-hexanone, acetone, m- and p-xylene, methyl acetate, o-xylene, and toluene) were detected in surface soil samples at Site 7. 2-butanone and acetone were detected in all surface soil samples, while 2-hexanone, m- and p-xylene, methyl acetate, o-xylene, and toluene were detected in one location each.
- **Pesticides and PCBs** – Two PCBs, Aroclor-1254 and Aroclor-1260, were detected in surface soil samples. One or more detections were found at all sample locations except DP04 and DP06.
- **Metals** – Twenty-five metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in surface soil samples. One or more detections were found at all sample locations.
- **Wet Chemistry (pH and TOC)** – pH ranged from 6.0 to 7.9, while TOC ranged from 760 mg/kg to 15,000 mg/kg.

8.3.2 Subsurface Soil Analytical Results

A total of 19 subsurface soil samples were collected at Site 7 during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

VOCs – Fourteen VOCs (2-butanone, 2-hexanone, acetone, benzene, bromomethane, carbon disulfide, cyclohexane, ethylbenzene, isopropylbenzene, m- and p-xylene, methyl acetate, methylcyclohexane, o-xylene, and toluene) were detected in subsurface soil samples. One or more detections were found at all locations with the exceptions of locations DP04, DP05, DP06, DP10, DP13, DP14, DP17, and DP18.

Pesticides and PCBs – One PCB, Aroclor-1260, was detected at three locations, DP01, DP10, and DP11.

Metals – Twenty-five metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in subsurface soil samples. Multiple detections were found at all sample locations.

8.4 Human Health Risk Screening

The HHRS for Site 7 was conducted in three steps using the risk-ratio technique (Navy, 2000) described in detail in Section 3.4. Results were reported for both the Navy and the MDE target risk levels. An overview of the various potential receptors and exposure pathways addressed in the HHRS is discussed in Section 3.4.1. The supporting tables for the evaluation are presented in Appendix E.5.

Surface Soil

The risk-based screening and risk-ratio evaluation for surface soil at Site 7 are provided in Appendix E.5, Tables 2.1 and 2.1a.

Step 1: Three constituents were identified as COPCs: Aroclor-1260, cyanide, and vanadium.

Step 2: Cumulative cancer risk of 4×10^{-6}; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the 1×10^{-5} MDE target risk level. Target organ HIs ranging from 0.1 to 0.2 did not exceed the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 or the MDE target HI of 1. No constituents were identified as COPCs.

Of the constituents that were 100 percent non-detected, none exceeded the RSL. Screening criteria were not available for several constituents.

Exposure to surface soil at Site 7 would not be expected to result in any unacceptable human health risks.

Subsurface Soil

The risk-based screening and risk-ratio evaluation for subsurface soil at Site 7 are provided in Appendix E.5, Tables 2.2 and 2.2a.

Step 1: Five constituents were identified as COPCs: aluminum, hexavalent chromium, iron, manganese, and thallium.

Step 2: Cumulative cancer risk of 1×10^{-6}; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the 1×10^{-5} MDE target risk level. Target organ HIs ranged from 0.3 to 0.6. The target organ HI of 0.6 is greater than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 but less than the MDE target HI of 1. The only constituent contributing to a cumulative target organ HI greater than 0.5 and identified as a COPC was thallium. No COPCs were identified based on MDE target hazard levels.

Of the constituents that were 100 percent non-detected, none exceeded the RSL. Screening criteria were not available for several constituents.

Based on the results of the human health screening using Navy target risk levels, exposure to subsurface soil at Site 7 may result in unacceptable human health risks associated with thallium. There are no COPCs based on MDE target risk levels.

8.5 Ecological Risk Screening

The ERA for surface soil at Site 7 was conducted using the risk-ratio technique (CNO, 1999) described in detail in Section 3.5. An overview of the various potential receptors and exposure pathways addressed in the ERA is discussed in Section 3.5.2. The supporting tables for the evaluation are presented in Appendix F.

Of the detected analytes, three VOCs (m- and p-xylene, methyl acetate, and o-xylene), one PCB (Aroclor-1260), and seven metals (aluminum, chromium, cyanide, iron, thallium, vanadium, and zinc) were retained as COPCs (Appendix F, Table 6).

The following constituents had HQs greater than 1 and were retained for further evaluation: Aroclor-1260 (HQ=9.4), chromium (HQ=2,800), cyanide (HQ=64), thallium (HQ=200), vanadium (HQ=156), and zinc (HQ=2.17). The constituents m- and-p xylene, methyl acetate, o-xylene, aluminum, and iron were also retained because an ESV was not available.

Maximum-detected concentrations of inorganic chemicals in Site 7 surface soils are compared to the 95% UTLs for Soil Grouping 3 sites (Appendix F, Table 10). Of the COPCs identified in Site 7 surface soils, the detected concentrations of vanadium and zinc exceeded the background 95% UTL value for Background Soil Group 3 sites and are considered to be site-related.

Exposure to surface soil at Site 5 may result in unacceptable ecological risk associated with m- and p-xylene, methyl acetate, o-xylene, Aroclor-1260, vanadium, and zinc.

8.6 Findings and Recommendations

8.6.1 Findings

Attempts to physically locate the historical road network were inconclusive. Soil staining and odors were observed from samples collected along Transect 1; however, this was not noted at borings collected from Transects 2 and 3. The lack of clear physical evidence showing where the historical roadway was located may suggest that the soils have either been reworked or removed.

Based on the results of the analytical data, VOCs, PCBs, and metals were detected in surface and subsurface soils at Site 7. Based on the HHRS and ERA, the constituents presented in the following table may present potentially unacceptable risk and were retained as COPCs for Site7.

Media	COPCs	
	Human Health	Ecological
Surface Soil	None	m- and p-xylene, methyl acetate, and o-xylene, Aroclor-1260, vanadium, and zinc
Subsurface Soil	thallium[1.]	N/A

Note:

[1.] Only a COPC under Navy target risk levels.

8.6.2 Risk Considerations

Human Health

While thallium was retained as a COPC for subsurface soil, subsurface soil is not recommended for further evaluation based on the following considerations for thallium:

- There were no detections of thallium in surface soil exceeding the site-specific background values.
- There is significant uncertainty associated with the thallium toxicity value used to derive the RSL and calculate the noncarcinogenic hazard. Per Appendix A of the thallium Provisional Peer Reviewed Toxicity Value (PPRTV) document (USEPA, 2012), "For the reasons noted in the main document, it is inappropriate to derive a subchronic or chronic p-RfD for thallium. However, information is available which, although insufficient to support derivation of a provisional toxicity value, under current guidelines, may be of limited use to risk assessor. In such cases, the Superfund Health Risk Technical Support Center summarizes available information in an appendix and develops a screening value. Users of screening toxicity values in an appendix to a PPRTV assessment should understand that there is considerably more uncertainty associated with the derivation of a supplemental screening toxicity value than for a value presented in the body of the assessment."

Ecological

As discussed in Section 3.5.4.3 of the ERS, m- and p-xylene, methyl acetate, and o-xylene were retained as COPCs because ESVs did not exist for these chemicals. However, these chemicals do not warrant further evaluation since there is uncertainty associated with their risk because their risk cannot be definitively determined.

8.6.3 Recommendations

Site 7 is recommended for further evaluation based upon potential unacceptable ecological risk associated with Aroclor-1260, vanadium, and zinc in surface soil. Because surface soil was only collected from the unpaved study area of Site 7, only the unpaved study area is recommended for further evaluation. Although there is no longer physical evidence of the unpaved road network, the analytical data suggest that the sampling locations were reasonably accurate.

TABLE 8-1

Site 7 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S07-DP01				CBD-S07-DP02		CBD-S07-DP03		CBD-S07-DP04	
Sample ID	CBD-S07-SS01-1012	CBD-S07-SS01P-1012	CBD-S07-SB01-0608	CBD-S07-SB01P-0608	CBD-S07-SS02-1012	CBD-S07-SB02-0507	CBD-S07-SS03-1012	CBD-S07-SB03-0608	CBD-S07-SS04-1012	CBD-S07-SB04-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	06 - 08	06 - 08	0 - 0.5	05 - 07	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Chemical Name										
Volatile Organic Compounds (UG/KG)										
2-Butanone	1.2 J	0.58 U	0.49 UJ	0.53 U	1 J	2.6 J	1.1 J	2.6 J	6.5 J	0.52 U
2-Hexanone	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Acetone	48 J	17 J	4.9 UJ	5.3 U	35 J	4.9 UJ	12 J	5.2 U	190 J	5.2 UJ
Benzene	0.51 U	0.58 U	170 J	0.32 J	0.43 U	11	0.49 U	21	0.7 U	0.52 U
Bromomethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Carbon disulfide	0.41 B	0.31 B	15 B	1 B	0.46 B	0.99 B	2.3 B	1.8 B	0.32 B	0.21 B
Cyclohexane	0.51 U	0.58 U	570 J	2.5 J	0.43 U	0.49 U	0.49 U	430	0.7 U	0.52 U
Ethylbenzene	0.51 U	0.58 U	18 J	0.57 J	0.43 U	130	0.49 U	520	0.7 U	0.52 U
Isopropylbenzene	0.25 U	0.29 U	160 J	1.6	0.21 U	170	0.25 U	410	0.35 U	0.26 U
m- and p-Xylene	0.51 U	0.58 U	73 J	2.2	0.43 U	280	0.4 J	2,500	0.7 U	0.52 U
Methyl acetate	2.6 B	1.2 B	20 J	0.82 B	1.1 B	2.4 B	2.2 B	9.5	5.1 B	1 B
Methylcyclohexane	0.51 U	0.58 U	950 J	5 J	0.43 U	1,200	0.49 U	850	0.7 U	0.52 U
o-Xylene	0.25 U	0.29 U	41 J	1.9	0.21 U	82	0.15 J	660	0.35 U	0.26 U
Toluene	2.9	0.58 U	NA	0.47 B	0.43 U	4.3	0.43 B	40	0.49 B	0.52 U
Pesticide/Polychlorinated Biphenyls (UG/KG)										
Aroclor-1254	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Aroclor-1260	830	940	85	16 U	350	16 U	5.4 J	17 U	14 U	14 U
Total Metals (MG/KG)										
Aluminum	6,600	5,600	6,300	6,800	4,800	4,100	6,600	6,200	2,600	2,600
Antimony	0.17 J	0.13	0.13	0.14	0.23	0.074 J	0.13	0.12	0.077 J	0.076 J
Arsenic	1.6	1.6	3.1	3.4	2	1.5	2.3	0.31 B	1.3	1.7
Barium	22 J	16 J	16	16	20	12	23	19	6.4	7.9
Beryllium	0.36	0.29	0.77	0.85	0.3	0.48	0.41	0.41	0.15	0.2
Cadmium	0.11	0.084	0.65	0.71	0.1	0.26	0.15	0.28	0.024 J	0.011 J
Calcium	1,200	1,100	920	1,000	1,100	430	980	1,000	170	180
Chromium (hexavalent)	0.23 J	0.3 J	0.13 L	0.31 J	NA	NA	NA	NA	NA	NA
Chromium	21	21	28	27	11	12	17	2.4	5	4.5
Cobalt	2.2	2	4.6	5.2	1.9	1.7	2.6	0.54	0.94	0.77
Copper	4.4	3.4	5.2	4.7	3.6	2.3	3.3	1.8	2.2	2.1
Cyanide	0.029 J	0.058 U	0.059 U	0.062 U	0.056 U	0.063 U	0.057 U	0.067 U	0.053 U	0.049 U
Iron	6,200	5,900	12,000	12,000	5,600	5,100	8,200	11,000	3,900	4,500
Lead	10	7.7	8.8 L	7.4	8.5	3.8	9.6	2.6	3.4	2.7
Magnesium	1,500 K	1,600	2,200 K	2,100	740	780	1,300	1,900	210	260
Manganese	33	30	36	31	41	18	42	32	16	17
Mercury	0.017 J	0.011 J	0.0096 J	0.012 J	0.016 J	0.017 U	0.014 J	0.017 J	0.017 U	0.0067 J
Nickel	13 L	12 J	20 K	13	6.4	3.3	12	0.86	1.2	1.2
Potassium	650	680	1,100	1,200	420	570	560	1,200	240	280
Selenium	0.26 B	0.18 B	0.41 B	0.39 B	0.11 B	0.09 B	0.32 B	0.1 B	0.068 B	0.078 B
Silver	0.048 J	0.043 J	0.043 J	0.039 J	0.036 J	0.026 J	0.033 J	0.01 U	0.022 J	0.02 J
Sodium	30 B	23 B	130	150	6.6 B	50 B	8 B	75	25 U	25 U
Thallium	0.2	0.18	0.43	0.47	0.17	0.35	0.19	0.1	0.042 J	0.048 J

TABLE 8-1

Site 7 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S07-DP01				CBD-S07-DP02		CBD-S07-DP03		CBD-S07-DP04	
Sample ID	CBD-S07-SS01-1012	CBD-S07-SS01P-1012	CBD-S07-SB01-0608	CBD-S07-SB01P-0608	CBD-S07-SS02-1012	CBD-S07-SB02-0507	CBD-S07-SS03-1012	CBD-S07-SB03-0608	CBD-S07-SS04-1012	CBD-S07-SB04-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	06 - 08	06 - 08	0 - 0.5	05 - 07	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Vanadium	14	12	16 L	16	9.5	9.3	11	1.3	7.1	6.5
Zinc	27	21	180	190	24	43	31	23	5.3	6.3 B
Wet Chemistry										
pH (ph)	6.8	NA	NA	NA	7.8	NA	7.9	NA	6.2	NA
Total organic carbon (TOC) (mg/kg)	6,500	NA	NA	NA	4,500	NA	2,300	NA	760 J	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE 8-1

Site 7 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S07-DP05		CBD-S07-DP06		CBD-S07-DP07		CBD-S07-DP08		CBD-S07-DP09	
Sample ID	CBD-S07-SS05-1012	CBD-S07-SB05-0608	CBD-S07-SS06-1012	CBD-S07-SB06-0608	CBD-S07-SS07-1012	CBD-S07-SB07-0608	CBD-S07-SS08-1012	CBD-S07-SB08-0608	CBD-S07-SS09-1012	CBD-S07-SB09-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Chemical Name										
Volatile Organic Compounds (UG/KG)										
2-Butanone	7.8 J	0.42 U	6.8 J	0.47 U	5.1 J	0.57 U	8.7 J	1.1 J	1.4 J	4.1 J
2-Hexanone	0.55 J	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Acetone	250 J	4.2 UJ	97 J	4.7 UJ	88 J	24 J	150 J	42 J	48 J	88 J
Benzene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Bromomethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.64 J
Carbon disulfide	0.23 B	0.18 B	0.27 B	0.47 U	0.26 B	0.2 B	1.5 B	0.65 U	0.24 B	0.31 B
Cyclohexane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Ethylbenzene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Isopropylbenzene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
m- and p-Xylene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Methyl acetate	8.1	0.93 B	3.1 B	1.2 B	1.3 B	1.4 B	2.5 B	2 B	5.8 B	2.3 B
Methylcyclohexane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
o-Xylene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Toluene	0.27 B	0.42 U	0.34 B	0.47 U	0.51 U	0.57 U	0.87 B	0.65 U	0.46 U	0.75 U
Pesticide/Polychlorinated Biphenyls (UG/KG)										
Aroclor-1254	14 U	15 U	14 U	14 U	50	18 U	50	19 U	70 U	23 U
Aroclor-1260	4.2 J	15 U	14 U	14 U	65	18 U	60	19 U	110	23 U
Total Metals (MG/KG)										
Aluminum	2,900	1,600	4,500	2,600	6,200	10,000	5,400	10,000	5,300	7,800
Antimony	0.11	0.063 J	0.12	0.11	0.4	0.19	0.33	0.21	0.31	0.18
Arsenic	1.4	1.3	2.1	2.7	3.5	3	2.7	3.2	2.5	5.5
Barium	6.8	6.5	19	8.3	33	26	24	27	24	20
Beryllium	0.18	0.13	0.33	0.21	0.45	0.44	0.36	0.65	0.4	0.35
Cadmium	0.025 J	0.0072 J	0.077	0.026 J	0.52	0.058	0.27	0.097	0.15	0.097
Calcium	150	120	360	180	16,000	2,000	1,200	1,600	1,700	680
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	5.1	3.8	7.1	6.1	21	37	15	21	13	41
Cobalt	1.1	0.35	1.8	1.3	2.6	1.8	2.2	1.9	2.1	3.8
Copper	2.7	1.5	3.1	2.1	9.9	3.3	6.7	3.4	4.9	3.5
Cyanide	0.053 U	0.056 U	0.027 J	0.053 U	0.32	0.069 U	0.21	0.072 U	0.068 J	0.065 J
Iron	4,300	3,300	5,900	5,200	15,000	18,000	9,000	20,000	8,800	21,000
Lead	3.8	2.2	7.1	3.3	62	6.9	64	7.6	25	6.5
Magnesium	230	160	430	310	4,300	2,500	960	2,500	1,200	2,400
Manganese	20	7.5	71	36	130	88	90	150	120	250
Mercury	0.0062 J	0.017 U	0.012 J	0.017 U	0.047 J	0.027 J	0.033 J	0.028 J	0.022 J	0.024 J
Nickel	1.3	0.66	3.6	1.1	19	5.3	18	6.4	11	4.5
Potassium	270	200	300	350	1,000	1,500	460	1,400	720	1,400
Selenium	0.15 B	0.13 B	0.22 B	0.17 B	0.34	0.41 B	0.28 B	0.4 B	0.24 B	0.4 B
Silver	0.019 J	0.015 J	0.039 J	0.023 J	0.065	0.044 J	0.054	0.04 J	0.036 J	0.06
Sodium	9.5 B	9.8 B	8.6 B	8.4 B	46 B	920	50 B	900	110	380
Thallium	0.046 J	0.027 J	0.082	0.15	0.14	0.2	0.16	0.26	0.15	0.29

TABLE 8-1

Site 7 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S07-DP05		CBD-S07-DP06		CBD-S07-DP07		CBD-S07-DP08		CBD-S07-DP09	
Sample ID	CBD-S07-SS05-1012	CBD-S07-SB05-0608	CBD-S07-SS06-1012	CBD-S07-SB06-0608	CBD-S07-SS07-1012	CBD-S07-SB07-0608	CBD-S07-SS08-1012	CBD-S07-SB08-0608	CBD-S07-SS09-1012	CBD-S07-SB09-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Vanadium	7.3	5.1	9.8	7.2	78	17	78	9.9	51	14
Zinc	5.9	3.7	19	7.8	260	35	150	25 B	80	32
Wet Chemistry										
pH (ph)	6	NA	6.5	NA	7.1	NA	7.6	NA	7.3	NA
Total organic carbon (TOC) (mg/kg)	1,100	NA	4,200	NA	15,000	NA	9,900	NA	6,900	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE 8-1

Site 7 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S07-DP10		CBD-S07-DP11	CBD-S07-DP12	CBD-S07-DP13	CBD-S07-DP14	CBD-S07-DP15	CBD-S07-DP16	CBD-S07-DP17	CBD-S07-DP18	CBD-S07-DP19
Sample ID	CBD-S07-SB10-0204	CBD-S07-SB10P-0204	CBD-S07-SB11-0204	CBD-S07-SB12-0204	CBD-S07-SB13-0204	CBD-S07-SB14-0204	CBD-S07-SB15-0204	CBD-S07-SB16-0204	CBD-S07-SB17-0204	CBD-S07-SB18-0204	CBD-S07-SB19-0204
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04
Chemical Name											
Volatile Organic Compounds (UG/KG)											
2-Butanone	0.44 U	0.43 U	0.46 B	3.2 B	0.44 U	0.4 U	12 B	0.5 U	0.53 U	0.5 U	0.53 U
2-Hexanone	0.44 UJ	0.43 UJ	0.42 UJ	0.41 UJ	0.44 UJ	0.4 UJ	0.69 J	0.5 U	0.53 U	0.5 U	0.53 U
Acetone	40 B	5.8 B	25 B	44 B	28 B	4 U	81 J	5 U	5.3 U	5 U	5.3 UJ
Benzene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.2 J	0.5 U	0.53 U	0.5 U	0.53 U
Bromomethane	0.44 U	0.43 U	0.42 U	0.39 J	0.44 U	0.4 U	1.2 J	0.5 U	0.53 U	0.5 U	0.53 U
Carbon disulfide	0.4 B	0.42 B	0.68 B	0.45 B	0.43 B	0.51 B	0.41 B	0.38 B	0.39 B	0.42 B	0.25 J
Cyclohexane	0.44 U	0.43 U	0.13 J	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Ethylbenzene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Isopropylbenzene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
m- and p-Xylene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Methyl acetate	1 B	0.83 B	0.93 B	0.73 B	0.87 B	0.85 B	0.95 B	1.2 B	1.5 B	1.2 B	1.6 B
Methylcyclohexane	0.44 U	0.15 J	0.28 J	0.41 U	0.44 U	0.4 U	0.46 U	0.21 J	0.53 U	0.5 U	0.53 U
o-Xylene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Toluene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Pesticide/Polychlorinated Biphenyls (UG/KG)											
Aroclor-1254	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1260	4.6 J	14 U	4.8 J	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Total Metals (MG/KG)											
Aluminum	3,900	3,600	4,400	4,400	7,200	9,000	5,900	2,200	5,200	5,100	3,100
Antimony	0.082 J	0.058 J	0.06 J	0.086 J	0.16	0.14	0.19	0.062 J	0.19	0.17	0.086 J
Arsenic	1.7	1.9	2.2	3.5	4	4.6	4.2	1	2.6	3.1	1.1
Barium	23	26	26	38	14	33	19	16	28	23	8.8
Beryllium	0.4	0.4	0.36	0.69	0.27	0.36	0.51	1.1	0.61	0.5	0.22
Cadmium	0.055	0.025 B	0.042 J	0.05	0.034 J	0.069	0.028 J	0.1	0.063	0.14	0.02 J
Calcium	410 J	280 J	4,300	540	580	700	950	1,900	3,700	1,400	3,400
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	4.5	4.8	4.8	5.9	13	13	8.2	8.2	7.8	9.5	8.7
Cobalt	1.9	2	1.7	3.3	2.1	2	2.8	0.53	3.5	2.2	0.67
Copper	2.2	2.3	2.3	2.8	4.4	4.3	3.1	1.5	2.9	2.1	1.2
Cyanide	0.046 J	0.033 J	0.053 U	0.053 U	0.058 U	0.053 U	0.054 U	0.054 U	0.04 J	0.054 U	0.057 U
Iron	5,100	5,800	7,200	9,600	11,000	13,000	14,000	11,000	9,100	8,400	3,500
Lead	7 J	4.1 J	3.3	4	5.5	6.6	3.7	2.4	3.2	3.9	2
Magnesium	360	370	640	370	790	790	500	580	610	700	1,000
Manganese	100	91	71	110	60	68	62	76	210	130	15
Mercury	0.0099 J	0.0067 J	0.017 U	0.017 U	0.017 U	0.015 J	0.017 U	0.017 U	0.0073 J	0.016 U	0.017 U
Nickel	3.2	2.9	2.8	2.3	4	4.5	2.3	1.3	3.2	3.7	1.2
Potassium	230	250	330	380	540	600	470	440	430	550	440
Selenium	0.29	0.075 B	0.2 B	0.3	0.3	0.29	0.45	0.26	0.27	0.13	0.13
Silver	0.019 J	0.014 J	0.017 B	0.023 B	0.029 J	0.032 J	0.028 J	0.025 J	0.025 J	0.028 J	0.036 J
Sodium	280 J	460 J	340	460	450	770	560	610	200	380	410
Thallium	0.13	0.095	0.1	0.098	0.12	0.15	0.11	0.076	0.17	0.19	0.14

TABLE 8-1

Site 7 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S07-DP10		CBD-S07-DP11	CBD-S07-DP12	CBD-S07-DP13	CBD-S07-DP14	CBD-S07-DP15	CBD-S07-DP16	CBD-S07-DP17	CBD-S07-DP18	CBD-S07-DP19
Sample ID	CBD-S07-SB10-0204	CBD-S07-SB10P-0204	CBD-S07-SB11-0204	CBD-S07-SB12-0204	CBD-S07-SB13-0204	CBD-S07-SB14-0204	CBD-S07-SB15-0204	CBD-S07-SB16-0204	CBD-S07-SB17-0204	CBD-S07-SB18-0204	CBD-S07-SB19-0204
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04
Vanadium	6.4	7.3	8.6	9.4	17	21	15	7.3	9.4	8.9	4.3
Zinc	14 B	11 B	10 B	11 B	15 B	16 B	11 B	13 B	13 B	18 B	7.6 L
Wet Chemistry											
pH (ph)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

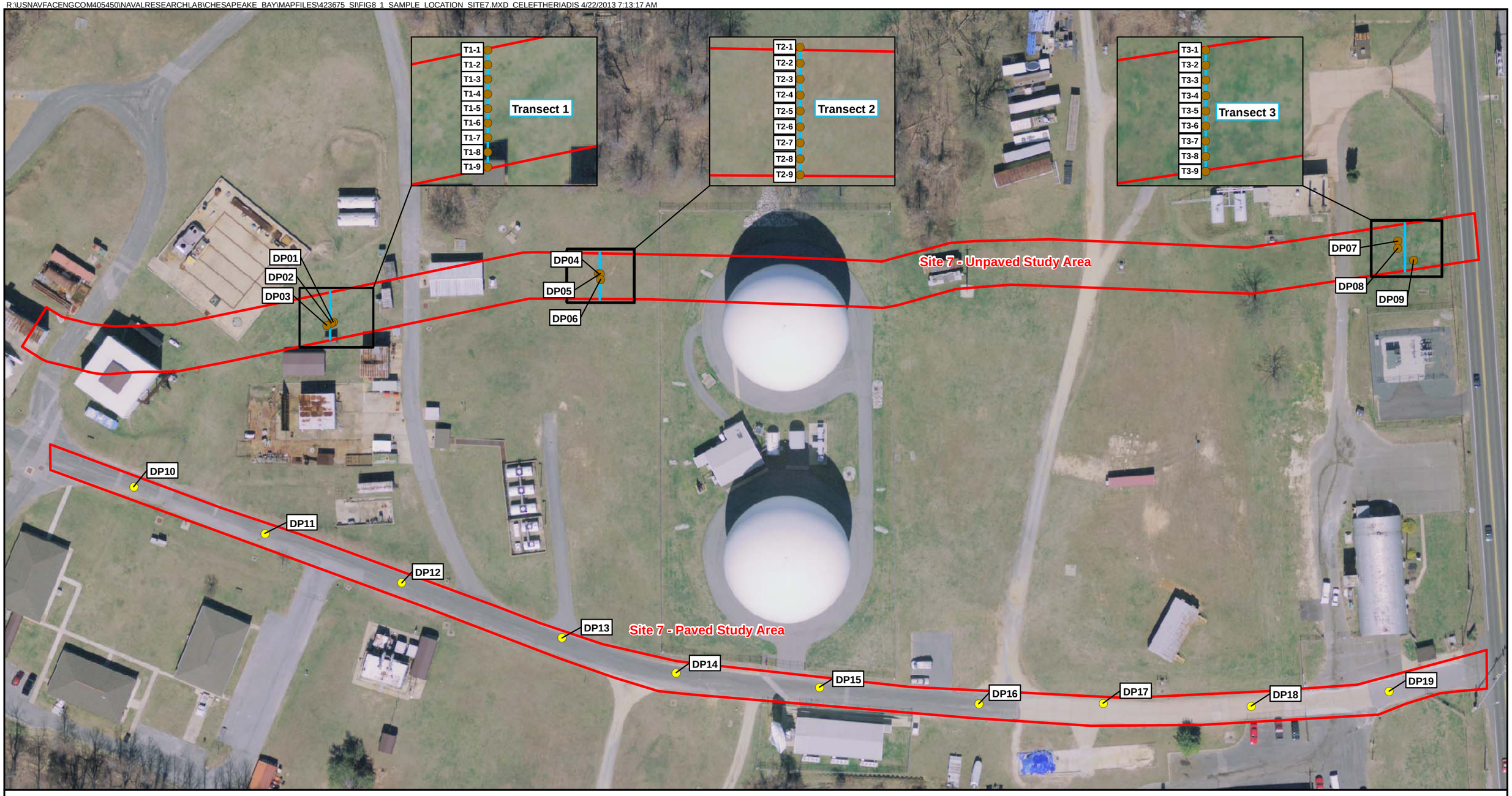
UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG8_1_SAMPLE_LOCATION_SITE7.MXD CELEFTHERIADIS 4/22/2013 7:13:17 AM



Legend

- Co-located Surface Soil and Subsurface Soil Location
- Subsurface Soil Location
- Soil boring transect
- Study Area Boundary

N

0 40 80 Feet

1 inch = 80 feet

Figure 8-1
Site 7 Sample Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

CH2MHILL

SECTION 9

Site 9 - Photo-processing Waste Discharge

9.1 Site Description

Site 9, also known as "Photo-processing Waste Discharge," is associated with a photography lab that was housed inside former Building 43 (**Figure 9-1**). Waste water from the photo-processing lab was reportedly disposed through a drain that discharged to the ground immediately outside the building (NEESA, 1984). Recent discussions with current base personnel indicated that the former photograph laboratory was located in the southeastern corner of Building 43. This operation reportedly occurred from the late 1950s until the early 1960s and from the late 1960s until 1975 (NEESA, 1984). The photograph laboratory was used once or twice during each year of operation, generating 10 to 15 gallons of waste solution (sodium thiosulfate and hydroquinone) per event (NEESA, 1984). For the purpose of defining a site boundary, a 20-foot boundary around the former building 43 was established, which would likely include the area of the direct discharge. The site boundary around the former Building 43 is 8,486 ft^2 in size. The building has been demolished and the site is relatively level and covered with grass with an approximate maximum elevation of 128 feet amsl. The road network that surrounds the former building is still intact.

9.2 Investigation Summary

9.2.1 Soil Sampling

Soil borings were advanced at four locations (DP01 through DP-4 [**Figure 9-1**]) across Site 9. The soil borings were advanced to a depth of 20 feet bgs. No signs of contamination (such as soil staining or odors) were observed in any of the soil borings. Co-located surface and subsurface soil samples were collected from each boring. Surface soil samples were collected from 0 to 6 inches bgs, while subsurface soil samples were collected from a depth of 13 to 15 feet bgs.

9.2.2 Groundwater Sampling

In accordance with the UFP-SAP, one temporary monitoring well was installed at location DP03. The temporary well was screened from 5 to 15 feet bgs. One grab groundwater sample was collected and sent to the laboratory for analysis.

9.3 Analytical Results

A summary of the constituents detected in soil and groundwater are presented in **Tables 9-1 and 9-2**, respectively. Data tables with the complete analytical results for Site 9 are located in Appendix D. The soil analytical data were evaluated with respect to potential human health receptors (Section 9.4) and ecological receptors (Section 9.5). The constituents detected in soil at Site 9 are discussed as follows.

9.3.1 Surface Soil Analytical Results

A total of four surface soil samples were collected at Site 9 during the October 2012 field event. The results of the surface soil sampling are summarized as follows:

- **VOCs** – Thirteen VOCs (2-butanone, 2-hexanone, acetone, benzene, carbon disulfide, cyclohexane, ethylbenzene, isopropylbenzene, m- and p-xylene, methylcyclohexane, o-xylene, styrene, and toluene) were detected in surface soil samples at Site 9. Two or more detections were found at each location with the majority of the detection found at location DP04.
- **SVOCs** – Twelve SVOCs (anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, bis[2-ethylhexyl]phthalate, chrysene, fluoranthene, indeno[1,2,3-cd]pyrene, phenanthrene, and pyrene) were detected in surface soil samples. Four or more detections were found at each location with the majority of detections found at location DP04.

- **Metals** – Twenty-three metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in surface soil samples. One or more detections were found at all sample locations.
- **Wet Chemistry (pH and TOC)** – pH ranged from 7.6 to 12, while TOC ranged from 760 mg/kg to 4,400 mg/kg.

9.3.2 Subsurface Soil Analytical Results

A total of four subsurface soil samples were collected at Site 9 during the October 2012 field event. The results of the subsurface soil sampling are summarized as follows.

VOCs – Four VOCs (2-butanone, acetone, carbon disulfide, and tetrachloroethene) were detected in subsurface soil samples. Each location had one or more detection, with the exception of location DP04, which had no detections.

SVOCs – Two SVOCs (4,6-dinitro-2-methylphenol and bis[2-ethylhexyl]phthalate) were detected in subsurface soils. One detection was found at all sample locations.

Metals – Twenty-four metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in subsurface soil samples. Multiple detections were found at all sample locations.

9.3.3 Groundwater Analytical Results

Two groundwater samples were collected at Site 9 during the October 2012 field event. The results of the groundwater sampling are summarized as follows.

VOCs – No VOCs were detected in the groundwater samples.

SVOCs – One SVOC (naphthalene) was detected in the groundwater samples.

Metals – Eighteen total metals (aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, thallium, and vanadium) and 18 dissolved metals (arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, and vanadium) were detected in the groundwater samples.

9.4 Human Health Risk Screening

The HHRS for Site 9 was conducted in three steps using the risk-ratio technique (Navy, 2000) described in detail in Section 3.4. Results were reported for both the Navy and the MDE target risk levels. An overview of the various potential receptors and exposure pathways addressed in the HHRS is discussed in Section 3.4.1. The supporting tables for the evaluation are presented in Appendix E.6.

Surface Soil

The risk-based screening and risk-ratio evaluation for surface soil at Site 9 are provided in Appendix E.6, Tables 2.1 and 2.1a.

Step 1: Three constituents were identified as COPCs: benzo(a)pyrene, benzo(b)fluoranthene, and hexavalent chromium.

Step 2: Cumulative cancer risk of 9×10^{-6} was calculated; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the 1×10^{-5} MDE target risk level. The target organ HI was 0.005; less than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. No constituents were identified as COPCs.

Of the constituents that were 100 percent non-detected, the maximum detection limit of a few SVOCs exceeded their respective RSL. Screening criteria were not available for several constituents.

Exposure to surface soil at Site 9 would not be expected to result in any unacceptable human health risks.

Subsurface Soil

The risk-based screening and risk-ratio evaluation for subsurface soil at Site 9 are provided in Appendix E.6, Tables 2.2 and 2.2a.

Step 1: Three constituents were identified as COPCs: hexavalent chromium, cobalt, and manganese.

Step 2: Cumulative cancer risk of 3×10^{-6}; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the 1×10^{-5} MDE target risk level. Cumulative target organ HIs ranged from 0.004 to 2; two target organ HI values were greater than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5 and the MDE target HI of 1. The only constituent contributing to a cumulative target organ HI greater than 0.5 (and 1) and identified as a COPC was cobalt.

Step 3 was not performed because less than five samples were available for subsurface soil.

Of the constituents that were 100 percent non-detected, no analytes had maximum detection limits that exceeded their respective RSL. Screening criteria were not available for several constituents.

Exposure to subsurface soil at Site 9 may result in unacceptable human health risks associated with cobalt.

Groundwater

The risk-based screening and risk-ratio evaluation for groundwater at Site 9 are provided in Appendix E.6, Tables 2.3 and 2.3a. Total metals concentrations were used in the HHRS.

Step 1: Six constituents were identified as COPCs: arsenic, cadmium, cobalt, iron, manganese, and thallium. Groundwater was also screened for the vapor intrusion from groundwater to indoor air pathway as one volatile constituent (naphthalene) was detected in groundwater. Naphthalene was not identified as a COPC for vapor intrusion from groundwater pathway (Appendix E.6, Tables 2.4 and 2.4 Supplement A).

Step 2: Cumulative cancer risk of 1×10^{-5} was calculated; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and equal to the MDE target risk level of 1×10^{-5}. Cumulative target organ HIs ranged from 0.1 to 1; one of the HI values was greater than the Navy cumulative target organ HI risk-ratio screening benchmark of 0.5. One constituent contributing to a cumulative target organ HI greater than 0.5 was identified as a COPC: thallium. No HI values exceeded the MDE target HI of 1.

Step 3 was not performed because less than five samples were available for groundwater.

Of the constituents that were 100 percent non-detected, the maximum detection limit of a few VOCs, SVOCs, and metals exceeded their respective RSL. Screening criteria were not available for several constituents.

Based on the Navy guidance (Navy, 2000), exposure to groundwater at Site 9 may result in unacceptable human health risks associated with thallium, based on potential use of groundwater as a future potable water supply. Following the MDE guidance, there were no COPCs identified.

Exposure to indoor air from vapor intrusion of groundwater at Site 9 would not be expected to result in any unacceptable human health risks.

9.5 Ecological Risk Screening

The ERA for surface soil at Site 9 was conducted using the risk-ratio technique (CNO, 1999) described in detail in Section 3.5. An overview of the various potential receptors and exposure pathways addressed in the ERA is discussed in Section 3.5.2. The supporting tables for the evaluation are presented in Appendix F.

Of the detected analytes, four VOCs (isopropylbenzene, m- and p-xylene, methylcyclohexane, and o-xylene), seven SVOCs (benzo[a]anthracene, benzo[b]fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene, and high molecular weight PAHs) and five metals (aluminum, chromium, hexavalent chromium, thallium, and vanadium) were retained as COPCs (Appendix F, Table 7).

The following constituents had HQs greater than 1 and were retained for further evaluation: benzo(a)anthracene (HQ=1.5), benzo(b)fluoranthene (HQ=3.7), chrysene (HQ=1.7), fluoranthene (HQ=2.1), phenanthrene (HQ=1.3), pyrene (HQ=3.2), high molecular weight PAHs (HQ=1.21), hexavalent chromium (HQ=2.63), chromium (HQ=2,400), thallium (HQ=150), and vanadium (HQ=34). The constituents isopropylbenzene, m- and p-xylene, methylcyclohexane, o-xylene, aluminum, and iron were also retained because their respective ESVs were not available.

Maximum-detected concentrations of inorganic chemicals in Site 9 surface soils are compared to the 95% UTLs for Soil Grouping 3 sites (Appendix F, Table 10). None of detected concentrations of the COPCs identified in Site 9 surface soils exceeded the background 95% UTL value for Background Soil Group 3 sites.

Exposure to surface soil at Site 9 may result in unacceptable ecological risk associated with isopropylbenzene, m- and p-xylene, methylcyclohexane, o-xylene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene and high molecular weight PAHs.

9.6 Findings and Recommendations

9.6.1 Findings

Based upon the observations of the fieldwork, no evidence of contamination (such as soil staining or odors) was observed in the DPT soil borings and evidence of the former photograph processing discharge could not be visually confirmed.

Based on the results of the analytical data, VOCs, SVOCs, and metals were detected in surface and subsurface soils at Site 9. Additionally, SVOCs and metals were detected in groundwater samples collected from Site 9. Based on the HHRS and ERA, the constituents presented in the following table may present potentially unacceptable risk and were retained as COPCs for Site 9.

	COPCs	
Media	**Human Health**	**Ecological**
Surface Soil	None	isopropylbenzene, m- and p-xylene, methylcyclohexane, o-xylene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene
Subsurface Soil	cobalt	N/A
Groundwater	thallium	N/A

9.6.2 Risk Considerations

Human Health

Subsurface Soil

While cobalt was retained as a COPC for subsurface soil, the following considerations should be made regarding further evaluation for cobalt:

- No signs of contamination (such as soil staining or odors) were observed in any of the soil borings.
- There were no detections of cobalt in surface soil exceeding the site-specific background value or the residential soil RSL
- Cobalt in subsurface soil exceeded the site-specific background value in only one location and was obtained from a sample collected from 13 to 15 feet bgs.
- The non-cancer toxicity value (RfD) used to derive the RSL for cobalt is not a Tier 1 value (from USEPA Integrated Risk Information System), but is a Tier 2 value. The Tier 2 value is from the PPRTVs database. The PPRTV value was adjusted based on a re-review of data in the PPTVs database in 2008 and decreased two orders of magnitude. The value is now derived using the highest level of modifying and uncertainty factors

(3,000, when previously it had been 10). This value change implies there is very low confidence in the RfD (non-cancer toxicity value used to derive the RSL).

Groundwater

While thallium was retained as a COPC for groundwater, it is unlikely that the concentration is representative of a potential site-related release and is more likely attributable to background concentrations. The rationale for this conclusion includes:

- Thallium was not detected in surface or subsurface soil above the residential RSL or the site-specific background value.
- The pathway for metals in groundwater would ultimately be through leaching from the subsurface soil.

Ecological

As discussed in Section 3.5.4.3 of the ERS, isopropylbenzene, m- and p-xylene, methylcyclohexane, and o-xylene were retained as COPCs because ESVs did not exist for these chemicals. However, these chemicals do not warrant further evaluation since there is uncertainty associated with their risk because their risk cannot be definitively determined.

9.6.3 Recommendations

Site 9 is recommended for further evaluation based upon potential unacceptable ecological risk is associated with benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, phenanthrene and pyrene in surface soil.

TABLE 9-1

Site 9 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S09-DP01			CBD-S09-DP02		CBD-S09-DP03		CBD-S09-DP04	
Sample ID	CBD-S09-SS01-1012	CBD-S09-SS01P-1012	CBD-S09-SB01-1315	CBD-S09-SS02-1012	CBD-S09-SB02-1315	CBD-S09-SS03-1012	CBD-S09-SB03-1315	CBD-S09-SS04-1012	CBD-S09-SB04-1315
Sample Date	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	13-15	0 - 0.5	13-15	0 - 0.5	13-15	0 - 0.5	13 - 15
Chemical Name									
Volatile Organic Compounds (UG/KG)									
2-Butanone	8.1 L	4.5 J	11 J	4 J	0.82 U	7 J	2.1 J	8.1 J	0.89 U
2-Hexanone	7.4 L	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Acetone	53 J	30 J	140	35	14 J	55	8.7 U	67	8.9 U
Benzene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.21 J	0.87 U	4.3	0.89 U
Carbon disulfide	1.2 B	0.79 B	13 J	0.26 B	0.38 B	8.4 J	0.4 B	1.1 J	0.41 B
Cyclohexane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	3.4 J	0.89 U
Ethylbenzene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	1.7	0.89 U
Isopropylbenzene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	1.1 J	0.44 U
m- and p-Xylene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	4.3	0.89 U
Methylcyclohexane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	6.5 J	0.89 U
o-Xylene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	2.9	0.44 U
Styrene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	1.8	0.44 U
Tetrachloroethene	0.63 UL	0.53 U	0.77 U	0.47 U	1.3 J	0.53 U	0.87 U	0.66 U	0.89 U
Toluene	0.34 B	0.53 U	0.44 B	0.47 U	0.82 U	0.28 B	0.87 U	8.6	0.42 B
Semivolatile Organic Compounds (UG/KG)									
4,6-Dinitro-2-methylphenol	35 U	36 U	51 U	39 U	30 U	35 U	35 J	78 U	30 U
Anthracene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	2.2 J	2.9 U	12 J	3 U
Benzo(a)anthracene	3.5 U	3.6 U	5.1 U	10 J	3 U	14 J	2.9 U	150 J	3 U
Benzo(a)pyrene	14 U	29 U	10 U	31 U	1.2 U	18 J	1.2 U	46 J	1.2 U
Benzo(b)fluoranthene	4.3 B	7.1 U	10 U	16 J	5.9 U	20 J	5.8 U	370 J	5.9 U
Benzo(g,h,i)perylene	11 B	3.6 U	5.1 U	7.8 B	3 U	12 B	2.9 U	91 J	3 U
Benzo(k)fluoranthene	7.1 UL	7.1 U	10 U	5.4 B	5.9 U	8 B	5.8 U	91 J	5.9 U
bis(2-Ethylhexyl)phthalate	16 J	36 U	14 J	12 J	12 J	9.4 B	8.4 B	91 J	11 J
Chrysene	2.9 B	3.6 U	5.1 U	9.3 B	3 U	13 B	2.9 U	170 J	3 U
Fluoranthene	3.6 J	3.6 U	5.1 U	12 J	3 U	18 J	2.9 U	210	3 U
Indeno(1,2,3-cd)pyrene	7.1 U	7.1 U	10 U	7.7 U	5.9 U	11 B	5.8 U	88 J	5.9 U
Phenanthrene	2.1 J	3.6 U	5.1 U	8.5 J	3 U	8 J	2.9 U	130	3 U
Pyrene	5.7 J	7.1 U	10 U	20 J	5.9 U	25 J	5.7 U	320 J	5.9 U
Total Metals (MG/KG)									
Aluminum	3,300	3,200	7,100	4,200	8,200	4,700	7,800	2,600	5,000
Antimony	0.13 B	0.1 B	0.11 B	0.38	0.3	0.88	0.22 B	0.095 B	0.14 B
Arsenic	0.62	0.42	3.1	2.2	1.1	2.7	3.3	0.87	4.4
Barium	11	10	18	19	16	22	15	9.7	9.9
Beryllium	0.26	0.2	0.48	0.3	0.89	0.26	1.4	0.18	0.18
Cadmium	0.076	0.05	1.5	0.29	0.23	0.16	0.37	0.03 J	0.37
Calcium	900	840	3,500	1,100	1,000	2,900	1,400	7,900	1,600
Chromium (hexavalent)	0.6	0.19 J	0.31 U	0.15 J	0.89	0.5	0.98	1.05	0.29 J
Chromium	12	12	28	18	22	15	25	9.1	28
Cobalt	0.64	0.52	2.2	2.1	44	1.9	3.6	0.68	0.76
Copper	3.1	3.7	3.7	13	3.9	4.2	4.6	1.8	3
Iron	3,200	2,900	13,000	9,100	10,000	13,000	17,000	3,500	9,300

TABLE 9-1

Site 9 Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S09-DP01			CBD-S09-DP02		CBD-S09-DP03		CBD-S09-DP04	
Sample ID	CBD-S09-SS01-1012	CBD-S09-SS01P-1012	CBD-S09-SB01-1315	CBD-S09-SS02-1012	CBD-S09-SB02-1315	CBD-S09-SS03-1012	CBD-S09-SB03-1315	CBD-S09-SS04-1012	CBD-S09-SB04-1315
Sample Date	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	13-15	0 - 0.5	13-15	0 - 0.5	13-15	0 - 0.5	13 - 15
Lead	3.6 J	2.9 J	5	28	5	11	4.9	1.9	4.9
Magnesium	750	750	3,500	1,800	2,300	1,300	2,600 K	810	1,400
Manganese	15 J	7.2 J	40	54	260	61	34	29	3.8
Mercury	0.041 J	0.039 J	0.017 U	0.047 J	0.015 J	0.012 J	0.0065 J	0.017 U	0.0082 J
Nickel	1.1 J	0.89 J	9.8	9	6.5	5	5.2	1.5	2
Potassium	530	530	1,900	620	1,300	670	1,700	470	1,100
Selenium	0.25	0.22	0.59	0.25	0.36 B	0.5	0.3 B	0.087 B	1 B
Silver	2.7 J	3.9 J	0.096	0.081	0.055	0.043 J	0.055	0.041 J	0.064
Sodium	28 B	21 B	89 B	57 B	120	25 B	100 B	25 U	98 B
Thallium	0.15	0.13	0.2	0.15	0.25	0.059 B	0.2	0.15	0.2
Vanadium	6.4	6.9	14	12	7.5	17	13 K	4.7	15
Zinc	15 B	15 B	59	47	80	20	150	8.2	55
Wet Chemistry									
pH (ph)	7.6	NA	NA	8.4	NA	8.7	NA	12	NA
Total organic carbon (TOC) (mg/kg)	840 J	NA	NA	760 J	NA	4,400	NA	1,000 J	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE 9-2

Site 9 Detected Analytical Results - Groundwater

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-S09-DP03	
Sample ID	CBD-S09-GW01-1012	CBD-S09-GW01P-1012
Sample Date	10/15/12	10/15/12
Chemical Name		
Volatile Organic Compounds (UG/L)		
No Detections		
Semivolatile Organic Compounds (UG/L)		
Naphthalene	0.03 J	0.05 J
Total Metals (UG/L)		
Aluminum	72 B	1,100 J
Arsenic	0.5 U	0.54 J
Barium	47	62
Beryllium	0.4 U	0.2 J
Cadmium	1.2	1.3
Calcium	14,000 J	34,000 J
Chromium	0.91 J	7.9 J
Cobalt	1.7	3.1
Copper	2.6 B	13 J
Iron	140 J	1,800 J
Lead	0.22 J	0.93 J
Magnesium	4,600 J	6,300 J
Manganese	21 J	110 J
Nickel	5.1 J	15 J
Potassium	9,100	10,000
Sodium	28,000	32,000
Thallium	0.22 B	0.29 J
Vanadium	0.45 J	2.9 J
Dissolved Metals (UG/L)		
Arsenic	2	0.27 J
Barium	37	38
Beryllium	0.2 J	0.4 U
Cadmium	1.3	1.1
Calcium	15,000 L	13,000
Chromium	1	0.6 J
Cobalt	1.5	1.5
Iron	8.1 J	30 J
Lead	0.45 J	0.5 U
Magnesium	5,100 L	4,700
Manganese	15	15
Nickel	3.7	3.6
Potassium	9,500	8,900
Selenium	1.6	0.64 J
Silver	0.51	0.1 U
Sodium	32,000 L	29,000
Thallium	1	0.32 J
Vanadium	0.66 J	0.31 J

Notes:

B - Analyte not detected above the level reported in blanks

J - Analyte present. Value may or may not be accurate or precise

L - Analyte present. Value may be biased low. Value may be higher

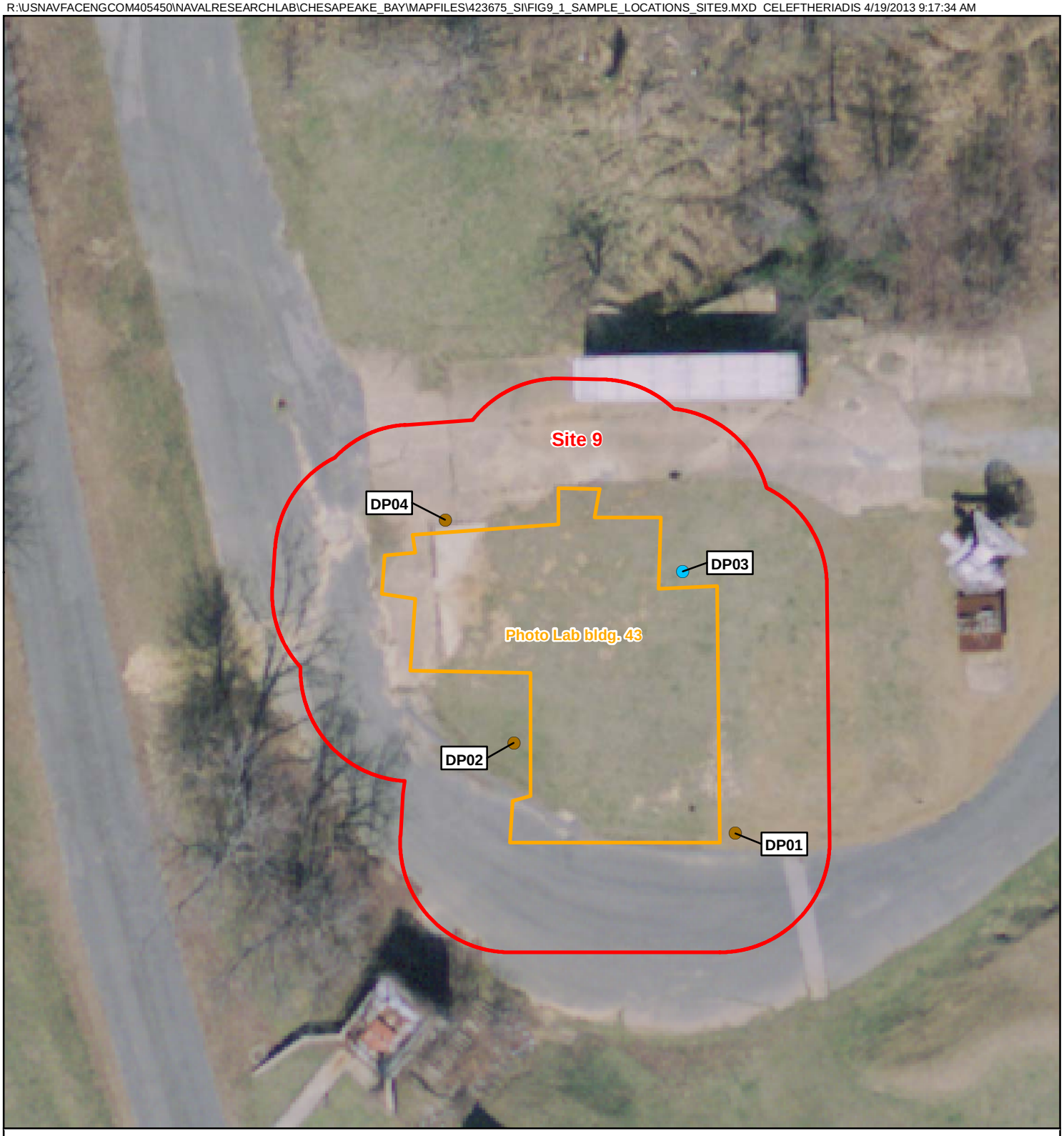
MG/L - Milligrams per liter

U - The material was analyzed for, but not detected

UG/L - Micrograms per liter

Shading indicates detection

R:\USNAVFACENGCOM405450\NAVALRESEARCHLAB\CHESAPEAKE_BAY\MAPFILES\423675_SI\FIG9_1_SAMPLE_LOCATIONS_SITE9.MXD CELEFTHERIADIS 4/19/2013 9:17:34 AM



Legend

- Co-located Surface Soil and Subsurface Soil Location
- Co-located Surface Soil, Subsurface Soil and Groundwater Location
- Footprint of former Building 43
- Site Boundary

N

0 12.5 25
Feet

1 inch = 25 feet

Figure 9-1
Site 9 Sample Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

CH2MHILL

SECTION 10

AOC C - Chemical Burial Site 2

10.1 Site Description

AOC C, also known as "Chemical Burial Site 2," is located on the western portion of NRL-CBD, south of Site 5 and west of Site 2 (**Figure 10-1**). Very little is known about the history of AOC C, but it is possible that the site history for AOC C may be consistent with the practices that were used at Site 2 (the area used for chemical burial and/or burning). AOC C's site use is thought to be consistent with Site 2 since both Site 2 and AOC C are shown on the same facility drawing dated January 1960 and are labeled similarly. The extent of AOC C has been defined within an area of 8,925 ft^2, as identified on the 1960 facility drawing. In a 1963 facility drawing, AOC C is no longer identified and historical aerial photography from this timeframe does not show any signs of land disturbance. Currently, AOC C is completely wooded and shows no signs of disturbance or historical site use. AOC C will be evaluated during this SI since chemical disposal practices and potential releases at this site cannot be ruled out.

10.2 Investigation Summary

10.2.1 Digital Geophysical Mapping Survey

A DGM survey was completed along four transects located across AOC C. The conductivity results are shown on Figure 1 of Appendix A while the in-phase results are shown on Figure 2 of Appendix A. No changes were indicated in either set of results suggesting that the soil is consistent with no change in soil type.

10.2.2 Test Pitting

Based on the lack of evidence from the DGM results suggesting that chemical burial or land disturbance occurred at AOC C, no test pits were performed and instead the investigation of this area moved on to DPT soil sampling.

10.2.3 Soil Sampling

Based on the lack of evidence indicating that chemical burial occurred at the site based on the DGM results, five DPT sampling locations (DP01 through DP05 [**Figure 10-1]**) were spatially distributed across the site. Soil borings were advanced to a maximum depth of 30 feet bgs and no signs of waste materials or soil staining were encountered in any of the DPT locations. The soils at the site consisted of sands and clays consistent with Atlantic Coastal Plain deposits. Soil boring logs for each location are presented in Appendix C. Co-located surface soil and subsurface soil samples were collected from each of the five DPT sampling locations. Surface soil samples were collected from a depth of 0 to 6 inches bgs, while subsurface soil samples were collected from a depth ranging from 26 feet to 30 feet bgs. All samples were analyzed in accordance with the UFP-SAP.

10.2.4 Groundwater Sampling

One temporary monitoring well screened between 23 and 33 feet bgs was placed at location DP04. The temporary well was allowed to equilibrate; however, a groundwater sample was unable to be collected since the formation did not yield any groundwater.

10.3 Analytical Results

A summary of the constituents detected in soil are presented in **Table 10-1**. Data tables with the complete analytical results for AOC C are located in Appendix D. The soil analytical data were evaluated with respect to potential human health receptors (Section 10.4) and ecological receptors (Section 10.5). The constituents detected in soil at AOC C are discussed herein.

10.3.1 Surface Soil Analytical Results

A total of five surface soil samples were collected at AOC C during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

VOCs – Five VOCs (2-butanone, 2-hexanone, acetone, m- and p-xylene, and toluene) were detected in surface soil samples at AOC C. One or more detections were found at each location.

SVOCs – Nine SVOCs (acenaphthene, anthracene, benzoaldehyde, benzo[a]anthracene, benzo[b]fluoranthene, dimethyl phthalate, fluoranthene, phenanthrene, and pyrene) were detected in surface soil samples. The majority of the detections were found at locations DP02.

Pesticides and PCBs – No detections for pesticides or PCBS were found in the surface soil.

Metals – Twenty-three metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, thallium, vanadium, and zinc) were detected in surface soil samples. One or more detections were found at all locations.

Wet Chemistry (pH and TOC) – pH ranged from 5.2 to 5.4, while TOC ranged from 6,800 mg/kg to 11,000 mg/kg.

10.3.2 Subsurface Soil Analytical Results

A total of five subsurface soil samples were collected at AOC C during the October 2012 field event. The results of the subsurface soil sampling are summarized as follows.

VOCs – One VOC (2-butanone) was detected in subsurface soil at location DP01.

SVOCs – One SVOC (bis[2-ethylhexyl]phthalate) was detected in subsurface soil at location DP05.

Pesticides and PCBs – No detections for pesticides or PCBS were found in the subsurface soil.

Metals – Twenty-five metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, hexavalent chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in subsurface soil samples. Multiple detections were found at all sample locations.

10.4 Human Health Risk Screening

The HHRS for AOC C was conducted in three steps using the risk-ratio technique (Navy, 2000) described in detail in Section 3.4. Results were reported for both the Navy and the MDE target-risk levels. An overview of the various potential receptors and exposure pathways addressed in the HHRS is discussed in Section 3.4.1. The supporting tables for the evaluation are presented in Appendix E.7.Surface Soil

The risk-based screening and risk-ratio evaluation for surface soil at AOC C are provided in Appendix E.7, Tables 2.1 and 2.1a.

Step 1: No constituents were identified as COPCs; therefore, Step 2 was not performed for surface soil.

Of the constituents that were 100 percent non-detected, there were none with maximum detection limits exceeding their respective RSL. Screening criteria were not available for several constituents.

Exposure to surface soil at AOC C would not be expected to result in any unacceptable human health risks.

Subsurface Soil

The risk-based screening and risk-ratio evaluation for subsurface soil at AOC C are provided in Appendix E.7, Tables 2.2 through 2.2b.

Step 1: Three constituents were identified as COPCs: cobalt, manganese, and thallium.

Step 2: Cumulative cancer risk of 3×10^{-7} was calculated; this value is less than the 5×10^{-5} Navy risk-ratio screening benchmark and the MDE target risk level. Cumulative target organ HIs ranged from 0.4 to 5; several target organ HI values were greater than the Navy cumulative target organ HI risk-ratio benchmark of 0.5 and the MDE target HI of 1. The constituents contributing to a cumulative target organ HI greater than 0.5 were cobalt and thallium. One constituent contributes to a target organ HI above 1, cobalt.

Step 3: The constituents contributing to a cumulative target organ HI greater than 0.5 and identified as COPCs based on the Navy target level are cobalt and thallium. Cobalt contributes to a target organ HI greater than 1 and is identified as a COPC based on the MDE target level.

Of the constituents that were 100 percent non-detected, there were none with maximum detection limits exceeding their respective RSL. Screening criteria were not available for several constituents.

Exposure to subsurface soil at AOC C may result in unacceptable human health risks associated with cobalt and thallium based on Navy target risk levels, and cobalt based on MDE target risk levels.

10.5 Ecological Risk Screening

The ERA for surface soil at AOC C was conducted using the risk-ratio technique (CNO, 1999) described in detail in Section 3.5. An overview of the various potential receptors and exposure pathways addressed in the ERA is discussed in Section 3.5.2. The supporting tables for the evaluation are presented in Appendix F.

Of the detected analytes, one VOC (m- and p-xylene), one SVOC (benzaldehyde), and six metals (aluminum, chromium, cyanide, iron, thallium, and vanadium) were retained as COPCs (Appendix F, Table 8).

The following constituents had an HQ greater than 1 and were retained for further evaluation: cyanide (HQ=10.8), chromium (HQ=1,867), thallium (HQ=160), and vanadium (HQ =48). The constituent's m-and-p xylene, benzaldehyde, aluminum, and iron were also retained because an ESV was not available.

Maximum detected concentrations of inorganic chemicals in Site AOC C surface soils are compared to the 95% UTLs for Soil Grouping 2 sites (Appendix F, Table 10). None of detected concentrations of the COPCs identified in AOC C surface soils exceeded the background 95% UTL value for Background Soil Group 2.

Exposure to surface soil at AOC C may result in unacceptable ecological risk associated with m- and p-xylene and benzaldehyde.

10.6 Findings

10.6.1 Findings

Based upon the observations of the fieldwork (DGM survey and DPT sampling) at AOC C, no evidence of waste material was encountered. The DGM survey did not identify any areas where waste material may have been placed. No other signs of waste material placement such as soil staining or odors were observed in the DPT soil borings. This finding supersedes the pre-SI understanding of the site in which burial and/or burn pits were thought to have been present at the site and served as the potential source area. As a result, the SI results suggest that the chemical burial and/or burning pits do not exist and therefore no potential source of contamination was identified at AOC C.

Based on the results of the analytical data, VOCs, SVOCs, and metals were detected in surface and subsurface soils at AOC C. Based on the HHRS and ERA the constituents presented in the following table may present potentially unacceptable risk and were retained as COPCs for AOC C.

	COPCs	
Media	**Human Health**	**Ecological**
Surface Soil	None	m- and p-xylene, benzaldehyde
Subsurface Soil	cobalt and thallium[1]	N/A

Note:

[1.] Only a COPC based on Navy target risk levels. Other COPCs are COPCs based on both Navy and MDE target risk levels.

10.6.2 Risk Considerations

Human Health

While cobalt and thallium were identified as COPCs for subsurface soil, the following considerations should be made regarding further evaluation for cobalt and thallium:

- No evidence of contamination (such as soil staining or odors) or a potential source were observed in any of the soil borings.
- There were no detections of cobalt and thallium in surface soil exceeding the site-specific background values.
- The non-cancer toxicity value (RfD) used to derive the RSL for cobalt is not a Tier 1 value (from USEPA Integrated Risk Information System), but is a Tier 2 value. The Tier 2 value is from the PPTVs database. The PPTV value was adjusted based on a re-review of data in the PPTVs database in 2008 and decreased two orders of magnitude. The value is now derived using the highest level of modifying and uncertainty factors (3,000, when previously it had been 10). This value change implies there is very low confidence in the RfD (non-cancer toxicity value used to derive the RSL).
- There is significant uncertainty associated with the thallium toxicity value used to derive the RSL and calculate the noncarcinogenic hazard. Per Appendix A of the thallium PPRTV document (USEPA, 2012), "For the reasons noted in the main document, it is inappropriate to derive a subchronic or chronic p-RfD for thallium However, information is available which, although insufficient to support derivation of a provisional toxicity value, under current guidelines, may be of limited use to risk assessor. In such cases, the Superfund Health Risk Technical Support Center summarizes available information in an appendix and develops a screening value. Users of screening toxicity values in an appendix to a PPRTV assessment should understand that there is considerably more uncertainty associated with the derivation of a supplemental screening toxicity value than for a value presented in the body of the assessment."

Ecological

- As discussed in Section 3.5.4.3 of the ERS, m- and p-xylene, and benzaldehyde, were retained as COPCs because ESVs did not exist for these chemicals. However, these chemicals do not warrant further evaluation since there is uncertainty associated with their risk because their risk cannot be definitively determined.

10.6.3 Recommendations

AOC C is not recommended for further evaluation.

TABLE 10-1

AOC C Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOC-DP01			CBD-AOC-DP02		CBD-AOC-DP03		CBD-AOC-DP04	
Sample ID	CBD-AOC-SS01-1012	CBD-AOC-SS01P-1012	CBD-AOC-SB01-2830	CBD-AOC-SS02-1012	CBD-AOC-SB02-2830	CBD-AOC-SS03-1012	CBD-AOC-SB03-2830	CBD-AOC-SS04-1012	CBD-AOC-SB04-2628
Sample Date	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	26 - 28
Chemical Name									
Volatile Organic Compounds (UG/KG)									
2-Butanone	9.2 J	18	3.2 J	23 L	0.57 U	14	0.52 U	19 L	0.52 U
2-Hexanone	0.63 U	0.79 J	0.68 U	1.4 L	0.57 U	0.64 J	0.52 U	1.1 L	0.52 U
Acetone	770 J	630 J	51 B	750 J	5.7 U	580	5.2 U	450 J	5.2 U
m- and p-Xylene	0.48 J	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U
Toluene	3.5 J	7.7 J	0.68 U	9.5 L	0.57 U	13	0.52 U	22 L	0.52 U
Semivolatile Organic Compounds (UG/KG)									
Acenaphthene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.4 J	1.9 U	1.8 U	1.9 U
Anthracene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8	1.9 U	1.8 U	1.9 U
Benzaldehyde	19 L	12 L	19 R	200 L	19 UL	18 UL	19 R	18 R	19 R
Benzo(a)anthracene	4 B	4.1 B	1.9 U	4.1 J	1.9 U	17 B	1.9 U	1.8 U	1.9 U
Benzo(b)fluoranthene	5.8 B	3 B	3.7 U	2.2 J	3.8 U	18 B	3.8 U	3.5 U	3.9 U
bis(2-Ethylhexyl)phthalate	8.4 B	9.4 B	19 U	8.6 B	19 U	8.5 B	19 U	7.4 B	19 U
Dimethyl phthalate	2.9 B	3 B	3.7 U	2.2 J	3.8 U	2.5 B	3.8 U	3.5 U	3.9 U
Fluoranthene	9.1 B	1.9 U	1.9 U	5.6 J	1.9 U	30 B	1.9 U	1.8 B	1.9 U
Phenanthrene	4.4 B	3 B	1.9 U	1.9 J	1.9 U	11 B	1.9 U	1.8 B	1.9 U
Pyrene	7.7 B	3.7 U	3.7 U	6 J	3.8 U	35 B	3.7 U	2.1 B	3.8 U
Pesticide/Polychlorinated Biphenyls (UG/KG)									
No Detections									
Total Metals (MG/KG)									
Aluminum	9,600	11,000	11,000	10,000	3,500	10,000	2,000	9,100	2,400
Antimony	0.23	0.19	0.59	0.15	0.24	0.11	0.12	0.085 J	0.25
Arsenic	2.1	2.2	5	2.1	3.3	1.9	1.4	2.1	3.4
Barium	35	36	22	33	30	52	8.3	38	12
Beryllium	0.43	0.44	3.9	0.26	2.1	0.41	1.5	0.33	1.9
Cadmium	0.087	0.065	1.1	0.033 J	0.62	0.034 J	0.47	0.033 J	0.26
Calcium	310	290	38 B	340	160	160	100 B	260	140
Chromium (hexavalent)	0.22 U	0.22 U	0.26 J	NA	NA	NA	NA	NA	NA
Chromium	8.8	9.4	8.8	11	9.4	9.3	7.7	7.9	14
Cobalt	3.8	3.9	52	3.3	120	3.4	25	3.7	7.9
Copper	3.3	3	2.4	3.3	4	2.3	1.5	2.7	2.9
Cyanide	0.053 J	0.054 J	0.056 U	0.054 U	0.16	0.027 J	0.056 U	0.053 U	0.058 U
Iron	8,300	9,500	6,700	11,000	9,700	8,700	4,200	10,000	13,000
Lead	20	16	1.9	6.6	2.2	8.5	1.8	7.5	2.2
Magnesium	840	930	760	1,000	690	890	670	820	660
Manganese	130	120	240	73	670	65	200	76	98
Mercury	0.019 J	0.019 J	0.0085 J	0.016 J	0.017 U	0.0092 J	0.017 U	0.0064 J	0.017 U
Nickel	6.2	6.2	36	5.8	49	6	15	5.3	19
Potassium	480	490	490	490	420	460	430	500	460
Selenium	0.31	0.37	1.3	0.31	0.45	0.34	0.14 B	0.16 B	0.25 B
Silver	0.044 J	0.031 J	0.026 B	0.043 J	0.023 B	0.029 J	0.025 J	0.027 J	0.022 J

TABLE 10-1

AOC C Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOC-DP01			CBD-AOC-DP02		CBD-AOC-DP03		CBD-AOC-DP04	
Sample ID	CBD-AOC-SS01-1012	CBD-AOC-SS01P-1012	CBD-AOC-SB01-2830	CBD-AOC-SS02-1012	CBD-AOC-SB02-2830	CBD-AOC-SS03-1012	CBD-AOC-SB03-2830	CBD-AOC-SS04-1012	CBD-AOC-SB04-2628
Sample Date	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	26 - 28
Sodium	11 B	6.2 B	6.4 B	11 B	7 B	7.1 B	7.4 B	17 B	19 J
Thallium	0.12	0.12	0.49	0.13	0.92	0.12	0.48	0.099	0.18
Vanadium	14	14	9.2	17	6.5	13	6.3	13	8.8
Zinc	22 B	24	130 B	23	140	21 B	45 B	18 B	57 B
Wet Chemistry									
pH (ph)	5.2	NA	NA	5.2	NA	5.2	NA	5.4	NA
Total organic carbon (TOC) (mg/kg)	9,300	NA	NA	11,000	NA	8,800	NA	6,100	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE 10-1

AOC C Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOC-DP05	
Sample ID	CBD-AOC-SS05-1012	CBD-AOC-SB05-2729
Sample Date	10/16/12	10/16/12
Sample Depth (feet)	0 - 0.5	27 - 29
Chemical Name		
Volatile Organic Compounds (UG/KG)		
2-Butanone	3.4 J	0.59 U
2-Hexanone	0.44 U	0.59 U
Acetone	140 B	19 B
m- and p-Xylene	0.44 U	0.59 U
Toluene	0.47 B	0.59 U
Semivolatile Organic Compounds (UG/KG)		
Acenaphthene	1.8 U	2 U
Anthracene	1.8 U	2 U
Benzaldehyde	18 UL	20 UL
Benzo(a)anthracene	1.8 U	2 U
Benzo(b)fluoranthene	3.7 U	3.9 U
bis(2-Ethylhexyl)phthalate	15 B	53
Dimethyl phthalate	3 B	3.9 U
Fluoranthene	1.8 U	0.8 B
Phenanthrene	1.1 B	2 U
Pyrene	3.6 U	3.9 U
Pesticide/Polychlorinated Biphenyls (UG/KG)		
No Detections		
Total Metals (MG/KG)		
Aluminum	13,000	2,000
Antimony	0.13	0.19
Arsenic	3.6	1.7
Barium	55	70
Beryllium	0.44	2.7
Cadmium	0.036 J	2.5
Calcium	260	890
Chromium (hexavalent)	NA	NA
Chromium	14	8.6
Cobalt	4	30
Copper	3.6	1.6
Cyanide	0.055 U	0.059 U
Iron	15,000	12,000
Lead	9.8	1.4
Magnesium	1,300	470
Manganese	110	180
Mercury	0.016 J	0.017 U
Nickel	6.8	11
Potassium	650	320
Selenium	0.3 B	0.035 B
Silver	0.04 J	0.017 B

TABLE 10-1

AOC C Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOC-DP05	
Sample ID	CBD-AOC-SS05-1012	CBD-AOC-SB05-2729
Sample Date	10/16/12	10/16/12
Sample Depth (feet)	0 - 0.5	27 - 29
Sodium	14 B	25 U
Thallium	0.16	0.22
Vanadium	24	7.1
Zinc	26 B	30 B
Wet Chemistry		
pH (ph)	5.2	NA
Total organic carbon (TOC) (mg/kg)	6,800	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

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Legend

- Co-located Surface Soil and Subsurface Soil Location
- AOC Boundary

N

0 12.5 25

Feet

1 inch = 25 feet

Figure 10-1
AOC C Sample Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

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SECTION 11

AOC D - Water Tower

11.1 Site Description

AOC D, known as the water tower, is located on the western portion of NRL-CBD adjacent to Site 8 (**Figure 11-1**). The construction of the water tower dates to 1953 and currently remains onsite. The water tower has a reported capacity of 400,000 gallons for use as part of the potable water supply for the facility. Although there are no documented releases from this area, it is assumed that the ground surface below the water tower may have been impacted by lead due to lead-based paint migrating to the ground during maintenance on tower surface with lead-based paint, and from paint that has weathered over time. Recent documentation obtained from NRL-CBD shows that lead was detected at 148 mg/kg in paint chips obtained from the water tower in 2012. The document states that the last time the water tower was painted was in 1994, suggesting that the lead-based paint has been encapsulated by the more recent paint as lead-based paint use was banned in housing and other building settings in 1978. The condition of the paint surface on the water tower was noted as being in average condition with some localized areas of paint chipping or delaminating (Mumford-Bjorkman Associates, Inc., 2012).

11.2 Investigation Summary

11.2.1 Soil Sampling

Four surface soil samples were collected (DP01 through DP04 [**Figure 11-1**]) around the base of the water tower where lead-based paint chips would have likely migrated. Surface soil samples were collected from 0 to 6 inches bgs from each location and analyzed for lead in accordance with the UFP-SAP.

11.3 Analytical Results

A summary of the constituents detected in surface soil are presented in **Table 11-1**. Data tables with the complete analytical results for AOC D are located in Appendix D. The soil analytical data were evaluated with respect to potential human health receptors (Section 11.4) and ecological receptors (Section 11.5). The constituents detected in surface soil at AOC D are discussed as follows.

11.3.1 Surface Soil Analytical Results

A total of four surface soil samples were collected at AOC D during the October 2012 field event. The results of the surface soil sampling are summarized as follows.

Metals – One metal, lead, was analyzed and detected in all four surface soil locations.

11.4 Human Health Risk Screening

The HHRS for AOC D was conducted in three steps using the risk-ratio technique (Navy, 2000) described in detail in Section 3.4. An overview of the various potential receptors and exposure pathways addressed in the HHRS is discussed in Section 3.4.1. The supporting tables for the evaluation are presented in Appendix E.8.

Surface Soil

The risk-based screening and risk-ratio evaluation for surface soil at AOC D are provided in Appendix E.8, Table 2.1. Lead was the only constituent analyzed for in surface soil samples.

Step 1: Lead was detected at concentrations in surface soil samples greater than the screening level and was identified as a COPC.

Lead concentrations ranged from 1,200 mg/kg to 3,000 mg/kg; the average concentration was 2,300 mg/kg and all concentrations exceeded the screening level.

Exposure to surface soil at AOC D may result in unacceptable human health risks associated with lead, based on potential human exposure and risk.

11.5 Ecological Risk Screening

The ERA for surface soil at AOC D was conducted using the risk-ratio technique (CNO, 1999) described in detail in Section 3.5. An overview of the various potential receptors and exposure pathways addressed in the ERA is discussed in Section 3.5.2. The supporting tables for the evaluation are presented in Appendix F.

Lead was retained as a COPC, as the HQ was 25 (Appendix F, Table 9). Lead was the only constituent analyzed at this site.

The maximum detected lead concentration in AOC D surface soils was compared to the 95% UTL for Soil Grouping 3 sites (Appendix F, Table 10). Lead was detected at concentrations above this background value and is considered to be site-related.

Exposure to surface soil at AOC D may result in unacceptable ecological risk associated with lead.

11.6 Findings and Recommendations

11.6.1 Findings

Based upon the observations of the fieldwork, no physical evidence of contamination (such as paint chips) was encountered in the soil samples; however, documentation on the water tower indicates that the current paint does contain lead at a concentration of 148 mg/kg. No documentation was identified indicating lead-based paint abatement was previously performed for the water tower. Documentation does suggest that recent painting activities (1994) have been performed after lead-based paint use was curtailed.

Based on the results of the analytical data, lead was detected in surface soils at AOC D. Based on the HHRS and ERA, lead may present potentially unacceptable risk and was retained as a COPC for AOC D.

	COPCs	
Media	**Human Health**	**Ecological**
Surface Soil	lead	lead

11.6.2 Recommendations

AOC D is recommended for further evaluation based upon potential unacceptable human health and ecological risks associated with lead in surface soil.

If the documented lead concentration in paint on the tower (148 mg/kg) is representative of the entire tower surface based on the sample collected in 2012, it appears unlikely that further contamination of soils above the residential screening level of 400 mg/kg would occur. This is also supported by the documented recent painting of the tower in 1994, after lead-based paint was banned.

TABLE 11-1

AOC D Detected Analytical Results - Soil

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOD-SO01		CBD-AOD-SO02	CBD-AOD-SO03	CBD-AOD-SO04
Sample ID	CBD-AOD-SS01-1012	CBD-AOD-SS01P-1012	CBD-AOD-SS02-1012	CBD-AOD-SS03-1012	CBD-AOD-SS04-1012
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Chemical Name					
Total Metals (MG/KG)					
Lead	2,100	2,000	3,000	2,900	1,200

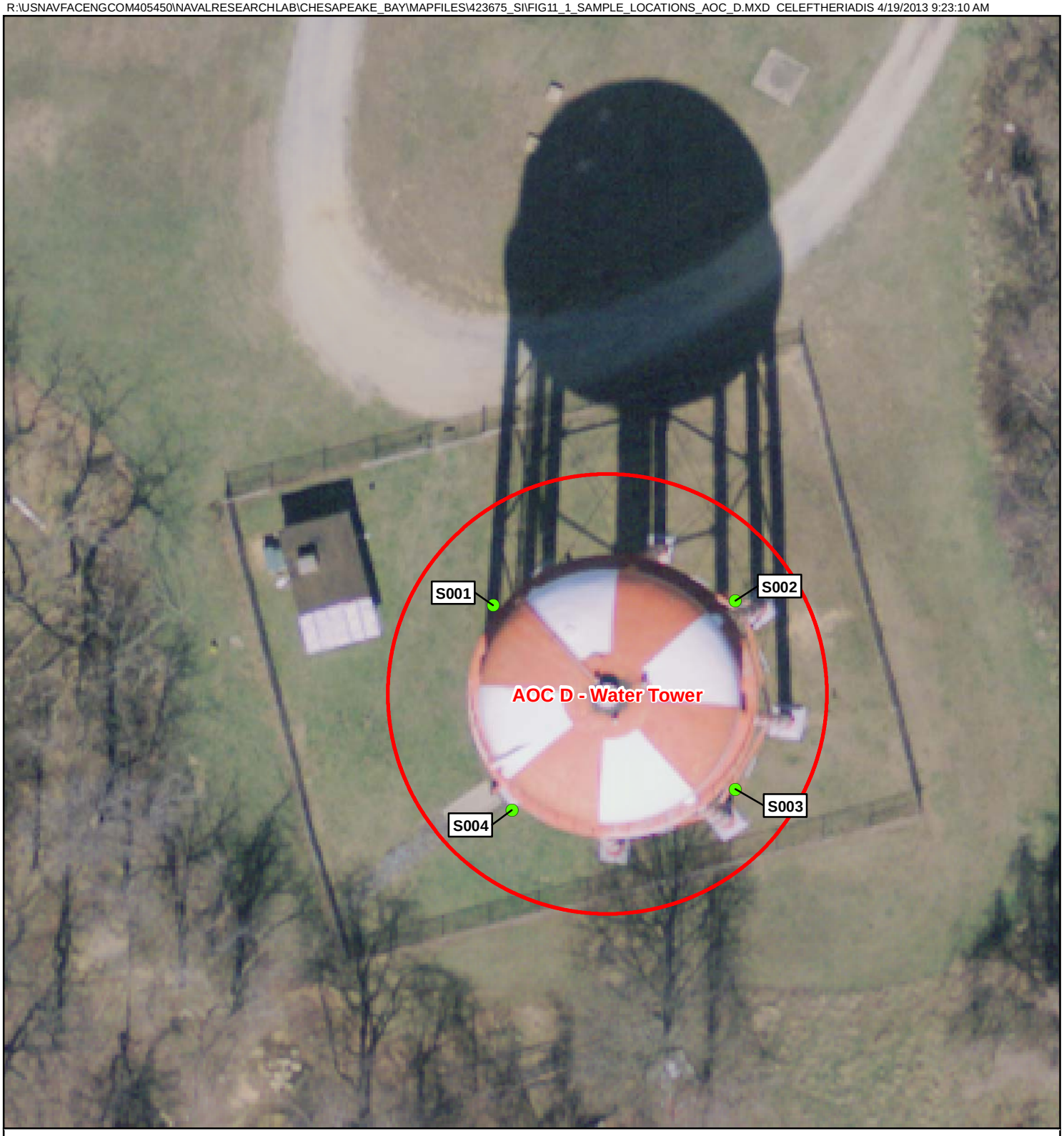
Notes:

Shading indicates detections

MG/KG - Milligrams per kilogram

UG/KG - Micrograms per kilogram

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Legend

- Surface Soil Location
- AOC Boundary

N

0 12.5 25

Feet

1 inch = 25 feet

Figure 11-1
AOC D Sample Locations
Base-Wide Site Inspection Report
NRL Chesapeake Bay Detachment
Chesapeake Beach, Maryland

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SECTION 12

Summary and Recommendations

The primary objective of the SI was to determine whether a site-related release occurred to the environment and to assess potential human health or ecological risks associated with the eight areas that were included in this investigation. This objective was achieved by collecting soil and groundwater data during a field investigation conducted in October 2012 and evaluating the data with respect to human health and ecological risk. A secondary objective of the SI was to determine whether media-specific concentrations warrant further evaluation or remedial action. Further evaluation of the surface soil conditions at six of the areas is required before determining whether remedial action is warranted. The results and recommendations for the investigation areas are summarized in **Table 12-1**.

TABLE 12-1
Investigation Results Summary

Investigation Area	Recommendation
Site 2 – Chemical Burial Area	No further evaluation.
Site 3 – Landfill No. 1	Further evaluation for human health (based on MDE target risk levels only) and ecological risks in surface soil.
Site 4 – Landfill No. 2	Further evaluation for human health and ecological risks in surface soil.
Site 5 – Landfill No. 3	Further evaluation for human health and ecological risks in surface soil.
Site 7 – Road Oil Application	Further evaluation for ecological risks in surface soil.
Site 9 – Photo-processing Waste	Further evaluation for ecological risks in surface soil.
AOC C – Chemical Burial Area 2	No further evaluation.
AOC D – Water Tower	Further evaluation for human health and ecological risks in surface soil.

The CSM has been updated to reflect the current understanding based on the SI results for each site. **Figures 12-1 and 12-2** present the updated CSM. The major updates to the CSM include the removal of potential source areas from Sites 2, 3, and AOC C based on a lack of evidence indicating land filling or chemical burial occurred. Additionally, the media that are potentially impacted were updated to reflect potential impacts to surface soil only at Sites 3, 4, 5, and 9 and AOC D.

LEGEND

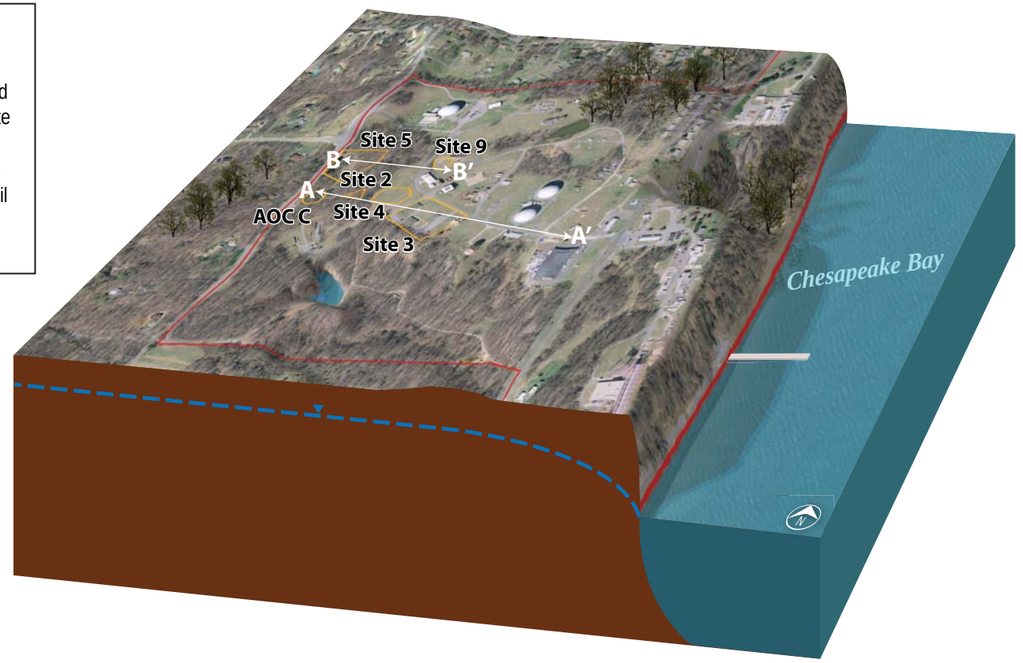
- Site Boundary
- Base Boundary
- Groundwater Flow Direction
- Water Table
- Potential Migration Pathway*

- Site 2 - Chemical Burial Site
- Site 3 - Landfill No. 1
- Site 4 - Landfill No. 2
- AOC C - Chemical Burial Site 2

*Infiltration/leaching of constituents from the potential source areas into surface soils.

Human Health Exposures and Receptors
Media – Surface Soil

- Current adult/adolescent trespassers and visitors, and adult industrial workers exposed to surface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.
- Future adult/adolescent trespassers and visitors, adult industrial workers, construction workers, and if the site is redeveloped adult and child residents exposed to surface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.



Ecological Exposures and Receptors
Media – Surface Soil

Wooded Habitat - Edge, densely wooded cover

Open Field Habitat - Short-grassed, open areas between woods and developed areas

- Receptors (both habitat types): Soil invertebrates, terrestrial plants, ground foraging (robin, mourning dove) and predatory birds (owl, hawk) and small mammals (mouse, shrew) exposed through the following pathways:
  - Incidental ingestion of chemicals from surface soil while foraging or grooming
  - Ingestion of chemicals that have accumulated in prey
  - Direct (dermal) contact with chemicals in surface soils
  - Inhalation of gaseous chemicals or chemicals adhered to suspended particulate matter

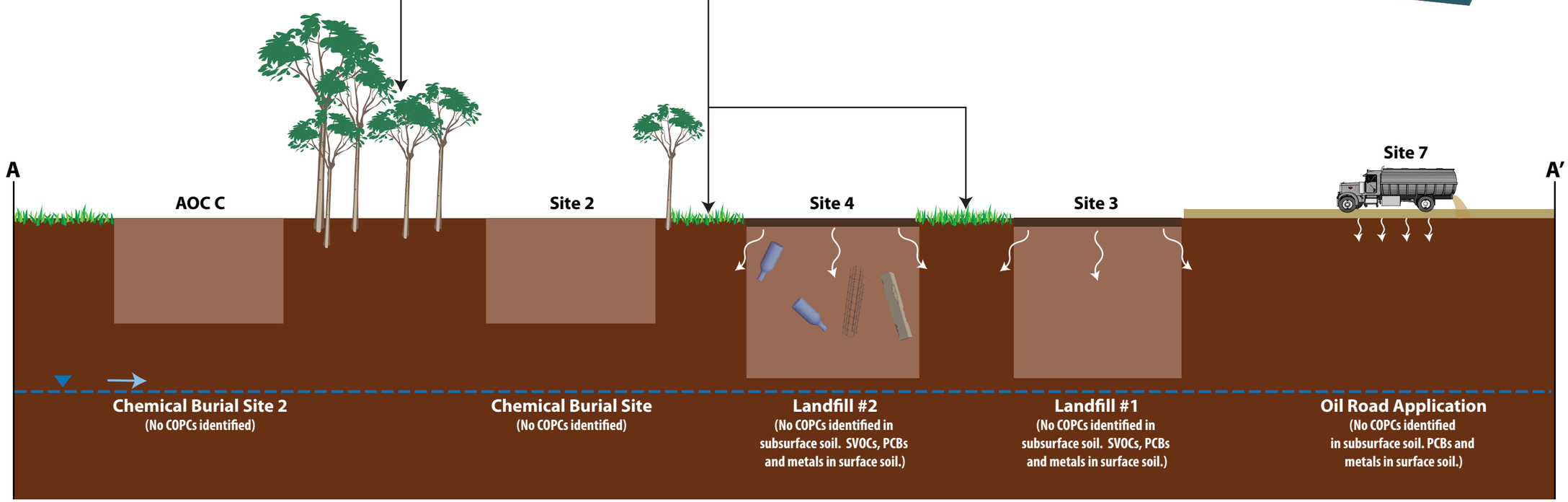


FIGURE 12-1
Conceptual Site Model
Base-Wide Site Inspection Report
Naval Research Laboratory - Chesapeake Bay Detachment (NRL-CBD)
Chesapeake Beach, Maryland

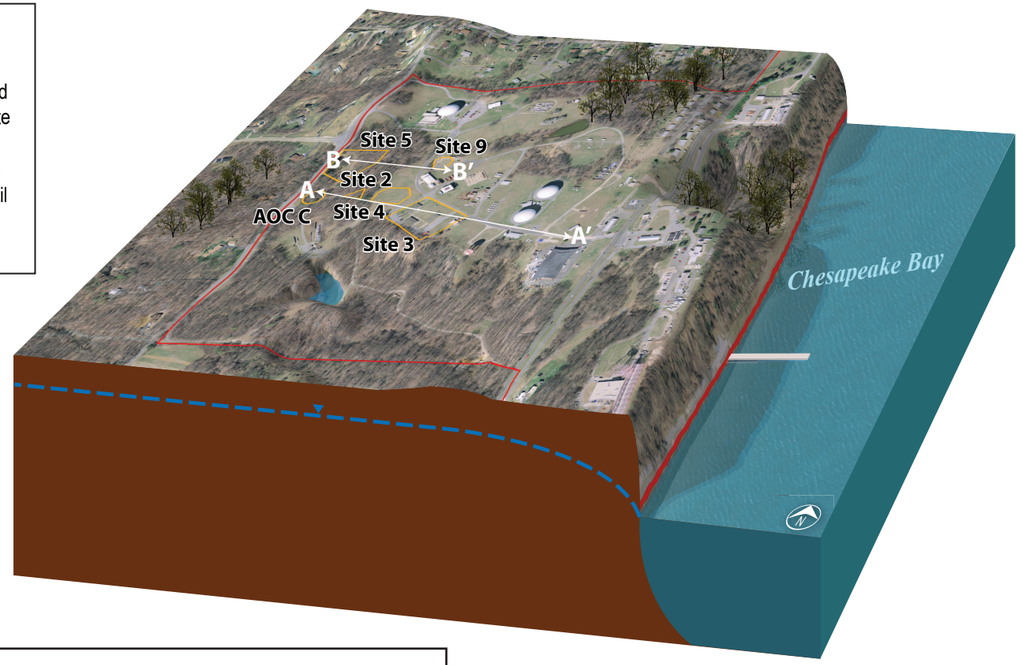
LEGEND

- Site Boundary
- Base Boundary
- Groundwater Flow Direction
- Water Table
- Potential Migration Pathway*
- Site 5 - Landfill No. 3
- Site 9 - Photoprocessing Waste Discharge

*Infiltration/leaching of constituents from the potential source areas into surface soils.

Human Health Exposures and Receptors
Media – Surface Soil

- Current adult/adolescent trespassers and visitors, and adult industrial workers exposed to surface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.
- Future adult/adolescent trespassers and visitors, adult industrial workers, construction workers, and if the site is redeveloped adult and child residents exposed to surface soil through incidental ingestion, dermal contact, and inhalation of particulate and volatile emissions.



Ecological Exposures and Receptors
Media – Surface Soil

Wooded Habitat - Edge, densely wooded cover

Open Field Habitat - Short-grassed, open areas between woods and developed areas

- **Receptors (both habitat types):** Soil invertebrates, terrestrial plants, ground foraging (robin, mourning dove) and predatory birds (owl, hawk) and small mammals (mouse, shrew) exposed through the following pathways:
  - Incidental ingestion of chemicals from surface soil while foraging or grooming
  - Ingestion of chemicals that have accumulated in prey
  - Direct (dermal) contact with chemicals in surface soils
  - Inhalation of gaseous chemicals or chemicals adhered to suspended particulate matter

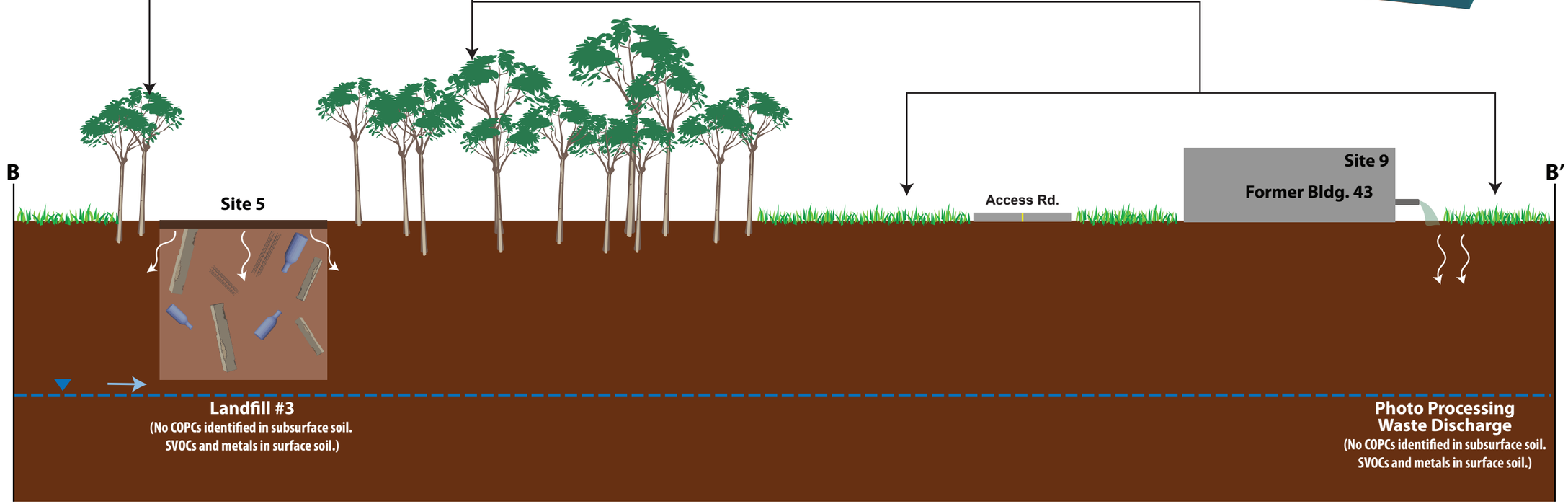


FIGURE 12-2
Conceptual Site Model
Base-Wide Site Inspection Report
Naval Research Laboratory - Chesapeake Bay Detachment (NRL-CBD)
Chesapeake Beach, Maryland

SECTION 13

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Appendix A
DGM Report

NAEVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys

GPR
MAGNETICS
ELECTROMAGNETICS
SEISMICS
RESISTIVITY
UTILITY LOCATION
UXO DETECTION
BOREHOLE CAMERA
STAFF SUPPORT

GEOPHYSICAL INVESTIGATION REPORT

Geophysical Survey for Buried Waste Delineation

Naval Research Laboratory – Chesapeake Bay Detachment
Chesapeake Beach, Maryland

Date of Investigation:

September 27, 2012

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APPENDIX & CD

Appendix A: QC Tests

Contents of CD: Project deliverables

- Raw Data
  - EM31-MK2 raw R31 (binary) and G31 (text) files
  - Raw XYZ files
  - Field Notes, Daily Log XLS files
  - Culture CSV file
- Processed Data
  - Final processed XYZ files by dataset
  - Static test processed XYZ, Geosoft map, and PDF plots
  - PDF and Geosoft map color coded gridding of instrument response data
  - Geosoft grid files
  - Shape files of interpreted feature locations
- Report –Report in Microsoft Word and PDF formats

ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
AOC	Area of Concern
DGM	Digital Geophysical Mapping
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations and Emergency Response
IR	Installation Restoration
mS/ft	milliSiemens per foot
NAD83	North American Datum of 1983
NMEA	National Marine Electronics Association
NRL-CBD	Naval Research Laboratory – Chesapeake Bay Detachment
OSHA	Occupational Safety and Health Administration
ppt	Parts per thousand
QC	Quality Control
RTK	Real Time Kinematic
sft	US Survey Feet
SI	Site Inspection
SOPs	Standard Operating Procedures

1.0 INTRODUCTION

NAEVA Geophysics, Inc. (NAEVA) was contracted by CH2M HILL to conduct Digital Geophysical Mapping (DGM) in support of a Site Inspection (SI) at the Naval Research Laboratory – Chesapeake Bay Detachment (NRL-CBD), Chesapeake Beach, Maryland. Field operations were conducted on September 27, 2012.

1.1 BACKGROUND AND PROJECT OBJECTIVES

The objective of the survey was to evaluate whether potential metallic or non-metallic wastes are present at the following five Installation Restoration (IR) sites: Sites 2, 3, 4, 5, and Area of Concern (AOC) C. Results from this survey will provide guidance during the planning stages of follow-up intrusive investigations at the five sites.

1.2 SCOPE OF WORK

Geophysical operations included the following tasks: functional checks to confirm proper operation, digital geophysical mapping of transect areas across the site, data processing and interpretation, and preparation of data deliverables. Data were collected along pre-defined transects with a nominal spacing of 25 feet. Because the sites surveyed contained both open and vegetated areas, both fiducial and Global Positioning System (GPS) methods were utilized. A discussion of these methods may be found in Section 3.1.

All data were processed, interpreted, and submitted to CH2M HILL in accordance with the project scope of work.

1.3 SITE LOCATION AND DESCRIPTION

The five IR sites are located at NRL-CBD, 5813 Bayside Road in Calvert County, Maryland. According to information provided by CH2M HILL, two of the sites, Site 2 and AOC C, also known as Chemical Burial Sites 1 and 2, respectively, are thought to have been used as disposal or burning areas for chemical wastes. Sites 3, 4, and 5, also known as Landfills No. 1, 2, and 3, respectively, are thought to contain between four to six excavation pits measuring approximately 25 feet by 25 feet by 20 feet. Inferred locations of historical disposal areas, where available, are superimposed on the geophysical survey results.

Vegetation within NRL-CBD varied from open grass to dense woods. Sites 3 and 4 were open, the former occupied by numerous structures and vehicles. The remaining areas were moderately to heavily vegetated, especially in Site 5, and were collected by fiducial positioning using stakes set by a licensed land surveyor prior to NAEVA's arrival on-site. Topography was generally flat

to slightly rolling. Site 5 slopes downward to the east. The geology is composed of the Tertiary Choptank and Calvert formations, interbedded fine-grained sand and silt, locally indurated to sandstone (Maryland Geological Survey, 1968), which should exhibit moderate conductivity depending on porosity, moisture content, and other factors discussed in Section 2.1.

2.0 EQUIPMENT

2.1 GEONICS EM31-MK2

The geophysical instrument used for the investigation at NRL-CBD is the Geonics EM31-MK2 terrain conductivity meter. The EM31-MK2 measures conductivity variations in the near subsurface. Conductivity varies within the earth and is controlled by the composition of the subsurface. Factors affecting the conductivity of a given area include: porosity, moisture content, dissolved electrolyte content, temperature and phase state of pore water, and the amount and composition of colloids, small particles dispersed within the water.

The terrain conductivity method uses a transmitter coil that produces a primary electromagnetic field that is conducted through the ground. The alternating electric current produces an alternating magnetic field that induces current flow in the subsurface. Current flow in the receiver coil is induced in response to the electromagnetic fields generated by the transmitter and the induced secondary ground currents. The strength of the secondary field is dependent on intercoil spacing, frequency of the primary field, and ground conductivity.

The EM31-MK2 provides an output of both the quadrature-phase (conductivity) and in-phase components of the induced electromagnetic field, which are recorded simultaneously. The quadrature-phase is a measurement of the terrain conductivity in milliSiemens per meter (mS/m). A Siemen is equivalent to a mho, which is the inverse of the ohm, the standard unit of resistivity. The ability to identify lateral variations in the shallow subsurface geology makes quadrature-phase EM31-MK2 data very useful in the delineation of subsurface anomalous features. The instrument was operated in the vertical dipole mode, with an effective depth of exploration of 6 meters, though detection capability decreases significantly with depth. A 55 gallon drum can be detected between 2 and 3.5 meters in the quadrature-phase and in-phase components, respectively. Since the ground is frequently not homogeneous, the conductivity measured is an apparent intermediate value of all detectable layers below the instrument.

The in-phase component of the EM31-MK2 data is primarily used in searching for buried metal, and is measured in units of relative parts per thousand (ppt) of the secondary to primary magnetic

field. A negative instrument response is usually expected over areas containing shallow buried metal (both ferrous and nonferrous). These two sets of data together make the EM31-MK2 a useful instrument in identifying both metallic and non-metallic features in the subsurface. The data are collected using the Geonics EM31 program and temporarily stored in a Juniper Allegro CX data logger prior to downloading to a laptop computer. The position of each EM31-MK2 reading between the 1 Hz GPS updates is interpolated in the software. The data logger was operated in automatic mode at the maximum rate of 5 readings per second.

2.2 TRIMBLE RTK GPS

A Trimble R8 Global Navigation Satellite System (GNSS) Real-Time Kinematic (RTK) GPS base station and rover were used for the real-time acquisition of positional data during geophysical data collection in open areas. The GPS base station was used in conjunction with a rover mounted over the operator's shoulder, coaxial with the EM31-MK2. Real-time corrections were broadcast at a rate of 1 Hz to the roving GPS unit via a radio link using a Trimble HBP450 UHF radio modem. Data quality derived from a satellite can depend on local topography, the elevation of the satellite in the sky, weather, and other factors.GPS positioning was only used on the sites that were open to the sky, therefore there were no problems with dropouts or degraded periods during the day.

The GPS positions were streamed into the Allegro data logger once per second using a National Marine Electronics Association (NMEA) GGA message and were recorded simultaneously with the EM31 data in the EM31 program. A GPS QC check was performed at the beginning of the day to ensure accuracy. During this QC check, the system provided positional accuracy of 2 cm horizontal and 3 cm vertical when a minimum of 5 satellites are available. An Excel table is included with the data deliverables displaying the offset of the measured point from the actual location. All GPS points and map data are presented in the State Plane coordinate system, Maryland, North American Datum of 1983 (NAD83), US Survey Feet.

3.0 METHODOLOGY

3.1 GEOPHYSICAL SURVEY ACTIVITIES

Prior to NAEVA's arrival, transect lines were staked out by a licensed surveyor. In the open areas navigation was accomplished using the handheld Trimble TSC2 data collector. The EM31-MK2 is operated by one person and carried at the hip with the long axis of the instrument parallel to walking direction, and when assembled measures approximately 4 meters long. Due to overhead

canopy in AOC C, Site 2, and Site 5 the instrument was operated using fiducial positioning, with markers placed in the data over each stake. Lines were numbered according to the transect ID and the operator walked at an even pace, pressing the fiducial button over each stake. New lines were created for each transect or for gaps around vegetation. Before processing the data, the local positions were warped to geodetic coordinates based on the known locations of the stakes reported by the surveyor.

3.2 DATA PROCESSING AND INTERPRETATION

3.2.1 Data Storage and Initial Editing

A daily log and field notes containing the day's activities and any pertinent site and collection information were input digitally into a PDA. Initial data processing was performed by the field team, which included reviewing the data for integrity and completeness, and creating positioned XYZ files for each data file and QC test (as described in Section 5.0) for use in further processing the geophysical data. For data collected using GPS, positions in the XYZ files were raw geodetic (Latitude-Longitude WGS84) coordinates. In areas without GPS, fiducial data markers were adjusted according to the down-line distances between stakes. If an issue with a file had been noted, such as a missing line or bad readings, the cause would be investigated and corrected as necessary; however, no data quality issues were identified.

3.2.2 Preprocessing

Converted raw data files were imported into Geosoft's Oasis montaj to perform the following:

- Review QC test prior to processing of the DGM data for that day
- Evaluate GPS positional accuracy by checking the QC check point and comparing the actual transect locations to the proposed transects; and fiducial positioning by evaluating the data density of each transect after the data had be converted into projected coordinates.
- Apply default lag correction to compensate for a lag in the data recorded as the instrument is moving
- Generate preliminary contour map(s) from gridded data

3.2.3 Final Processing

After completion of preprocessing, the data were further evaluated and processed to generate final processed data files. Final processing steps included:

- Refinement of lag correction
- Digital filtering and enhancement, as necessary

- Generation of formatted ASCII files containing processed data by dataset
- Generation of final maps for each dataset showing contoured gridded data and culture

3.2.4 Analysis

Lagged data were gridded in Geosoft Oasis montaj and separate maps were created for the conductivity and in-phase measurements. Analysis was completed using the minimum curvature gridded data.

Final processed XYZ (ASCII) files were created for each dataset. Each of the five sites was collected in a separate dataset and is presented on individual maps. Criteria for determining anomalous areas to be selected for further investigation included:

- The maximum amplitude of response with respect the local background conditions
- Location of the anomaly with respect to the survey area edge
-

Software used for this project included Geonics EM31 software for the Allegro CX version 1.18 (data collection), Geonics DAT31W version 2.06 (editing and preprocessing), and Geosoft Oasis montaj version 7.5 (advanced processing and gridding).

4.0 RESULTS

4.1 SUMMARY OF WORK PERFORMED

The digital geophysical mapping of NRL-CBD took place on September 27, 2012. A total of 7,980 feet were surveyed. Data collection was completed in accordance with the scope of work and technical specifications. At Site 5, dense vegetation prevented collection of portions of the transects. Noise levels varied across the site, with the highest in the vicinity of the buildings in Site 3. QC tests were conducted near Site 4 and Site 5 in an area free of metallic objects and show slight fluctuations, with low enough amplitude not to adversely affect the data. Figures 1 through 10 display the conductivity and in-phase maps of each of the five IR sites.

4.2 MOBILIZATION AND SITE SETUP

Prior to mobilization, an Activity Hazard Analysis (AHA) and Standard Operating Procedures (SOPs) were provided to CH2M HILL. All personnel mobilized to the site had current 8-hour and/or 40-hour OSHA HAZWOPER training and medical monitoring examinations in accordance with OSHA 29 CFR 1910.120 and 29 CFR 1910.134. NAEVA mobilized one field crew on September 26th and demobilized on the 27th following completion of data collection. Production

surveying began following an initial safety briefing and site orientation. Equipment was assembled and tested and the GPS base station was set up on a point provided by the surveyor and checked against a second control point. The control points utilized during this project are displayed in the table below (Maryland State Plane, NAD83).

Point Name	Easting (sft)	Northing (sft)	Elevation (sft)
3	1,445,046.144	361,653.355	123.000
4	1,445,194.533	361,537.224	119.110

4.3 GEOPHYSICAL SURVEY ACTIVITIES

Cultural objects and other surface metal that could affect the instrument response were recorded with GPS and are displayed in Figures 1 through 10 accordingly. The majority of these occur in Site 3, where a large number of buildings, utilities, and vehicles result in increased interference impacting the EM31-MK2 instrument. Small gaps exist on most lines in Site 5 due to thick vegetation, in particular along the northern boundary and the northern third of lines 61 and 36. All instrumentation worked properly as determined by the QC tests described in Section 5.0. .

4.4 DATA PROCESSING AND INTERPRETATION

All data were processed as described in Section 3.2. Values of conductivity and the in-phase component may increase or decrease over anomalous areas depending on the difference from the surrounding soil. Burial pits generally have a higher conductivity, but may be lower depending on the moisture content. Significant changes in conductivity over short distances are suspect, as a change in background geology will be gradual. Metallic objects will also cause spikes in the in-phase data, either positive or negative. The quadrature-phase is not as sensitive to metal, but larger objects or surface metal will be detected in this component as well, and will be visible by sharper spikes in the data rather than gradual changes.

Anomalies potentially indicative of buried wastes are identified in Figures 1 through 10. Areas of interest are marked with either lines or ovals, depending on the shape, lateral extent, and proximity to other anomalies. If changes in the background appeared to linearly cross multiple transects these areas were marked as well. In all cases while these anomalies may represent disposal areas, they may also be caused by changes in the local geology, such as groundwater or

soil type, as well as disturbances to the subsurface caused by construction and not the disposal of waste.

AOC C exhibits no areas of interest. No metal was detected in Site 2; however, two areas of elevated conductivity exist along the southern and northwestern boundaries as shown by conductivity readings over 20 mS/ft higher than background, marked with two blue lines. The conductivity anomaly with no corresponding inphase anomaly suggests possible non-metallic buried wastes. However, a road runs along the southern boundary and may be the cause of the southern conductivity change.

Due to the presence of surface metal, buildings, and utilities in Site 3, changes in subsurface conditions are masked by both the highly positive and negative inphase readings mask any changes in the background that may exist. The open grassy area between the three largest buildings depicts conductivity and in-phase anomalies that are characteristic of potential buried wastes but may be associated with underground utilities. Comparing this area with the results of the utility markout is recommended prior to conducting intrusive investigations at Site 3.

Site 4 contains several areas of interest shown on the maps with blue ovals, with the strongest conductivity change located near the southern end of line 57. There are numerous small in-phase responses that could represent buried metallic debris, including a small response near the suspected location of a burial pit.

Site 5 contains an area of interest near the northern end of line 61 that shows up well in the conductivity data but not in the in-phase, indicating possible buried non-metallic material. Other features are marked in both sets of data and may represent surface or buried metal. The largest area of interest is marked with an elongate oval in the vicinity of the suspected former disposal pit. The blue line crossing multiple transects follows a change in the background conductivity along what appears to be a linear trajectory.

The enclosed CD contains all raw and processed data, QC tests, and color contour maps for each site. A copy of this report may also be found in Adobe PDF and Microsoft Word formats.

5.0 QUALITY CONTROL

QC tests were conducted before, during and after data collection. QC data were plotted graphically and are included in Appendix A.

Serial number identifications were recorded for all instrument components (i.e. data logger, EM31-MK2, GPS). Prior to operation, the EM31-MK2 was assembled and functional checks were performed according to the user's manual. The following tasks were performed:

- Checked for proper battery voltage (± 4.3 volts)
- Checked null reading (± 1 mS/ft)
- Zeroed in-phase component (± 0.1 mS/ft)
- Checked phase (± 0.2 mS/ft)
- Checked sensitivity (22 – 26 mS/ft)

The scope of work specified along-transect point spacing should not exceed one foot. Data density statistics were calculated for all data collected and averaged about 2 readings per foot, except in Site 5 where the slower walking pace resulted in 3 readings per foot, both greater than the required 1 reading per foot.

In addition to the initial functional checks, the following QC procedures were performed and documented during the data collection process and reviewed by a qualified geophysicist:

GPS Check Point: At the beginning of the day after setting up the base station and before collecting any data, the GPS antenna was mounted on a survey pole and placed at a known point to check the accuracy. The measured position was compared to the reported location to check for proper operation. The location was stored in a Trimble Survey Controller unit. Positional discrepancies within 4 inches were considered acceptable, though the actual measurement was within 1 inch.

Static Background: Static tests were performed by positioning the survey equipment on the ground collecting data for a 1-minute period. During this time, the instrument was not moved. The purpose of the static test is to determine whether unusual levels of instrument or ambient noise exist and to check for consistent response. Though the EM31-MK2 measures apparent conductivity and thus absolute values are not expected, the response should be steady in the absence of external effects. Three static tests were conducted over the course of the day. The third test was conducted while carrying the instrument instead of setting it on the ground to demonstrate typical ambient noise that may exist in the survey data, hence the higher noise levels.

6.0 CONCLUSIONS

All tasks involved in the DGM of the NRL-CBD were completed in one day. Supporting QC data and all other requirements were within specifications and there is high confidence in the

reliability of the data collected. The geophysical survey covered approximately 1.5 miles of transect lines spaced at 25 feet, characterizing four acres across five sites for potential buried waste. Although heavy vegetation impeded progress in Site 5, the majority of the area was surveyed and several areas of interest were identified. With the exception of AOC C, in which changes in background response were minimal, and Site 3, in which the presence of surface metal and buildings limited the usefulness of the data, numerous features possibly representing buried waste, both metallic and non-metallic, were identified.

REFERENCES

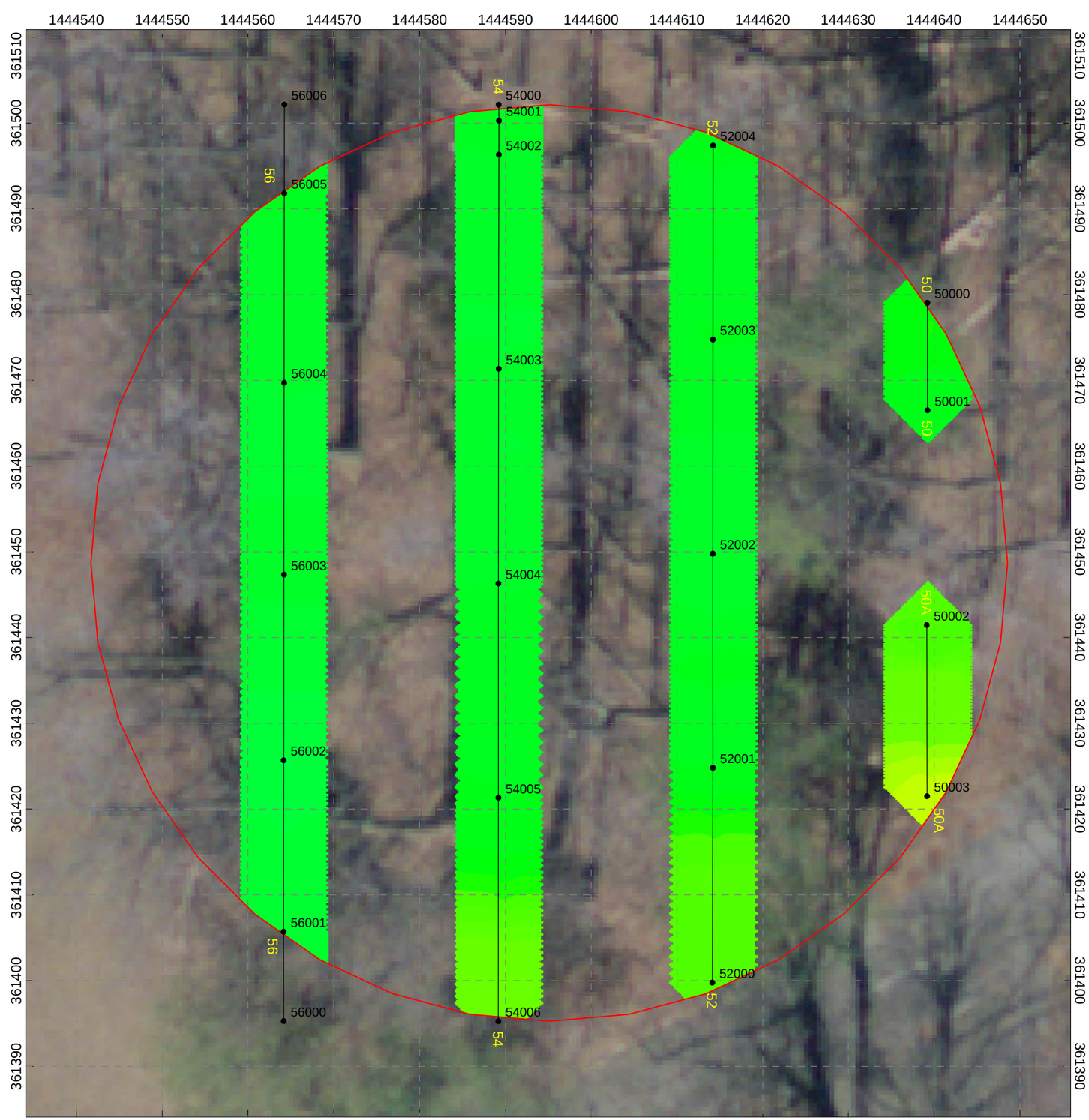
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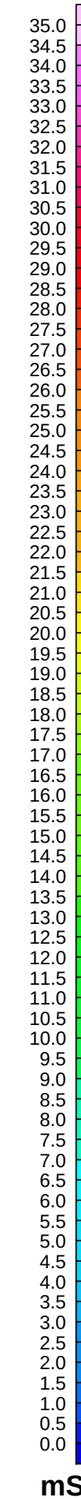
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Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 — Survey Stake (if noted)
- brush — Culture (if noted)
- Interpreted Feature (if noted)



mS/ft
Conductivity

10 0 10 20 30
US survey foot
NAD83 / Maryland CS83

Figure 1

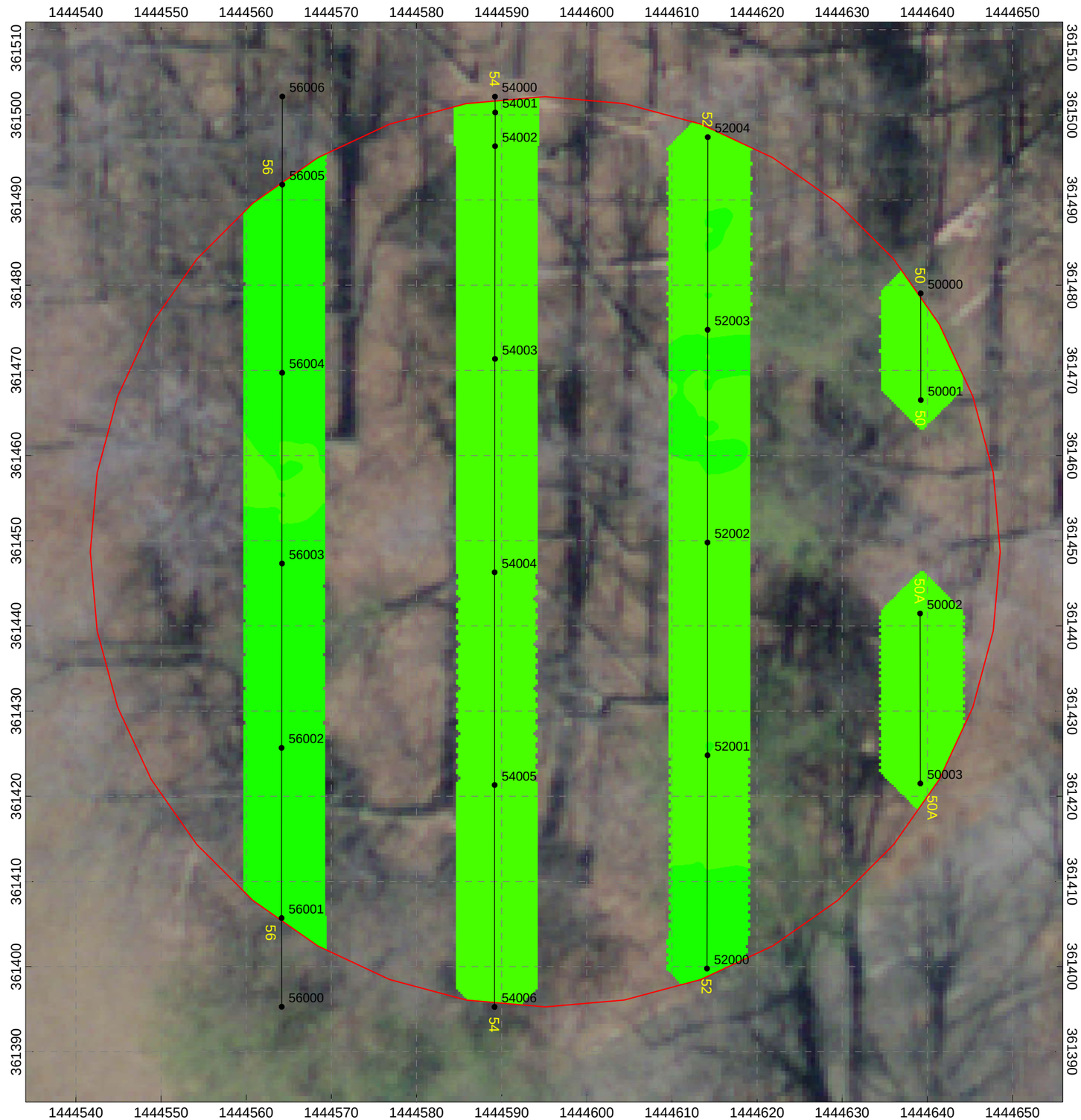
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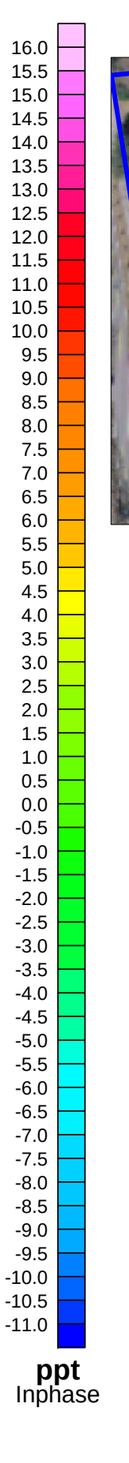
EM31 Conductivity
AOC C - Chemical Burial Site 2
Naval Research Laboratory - Chesapeake Bay Detachment
Chesapeaske Beach, Maryland

Date of Survey: September 27, 2012
Date of Map Creation: October 1, 2012

Map Approver: J. Guillard

NAEVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys

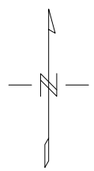






Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 — Survey Stake (if noted)
- brush — Culture (if noted)
- Interpreted Feature (if noted)



10 0 10 20 30

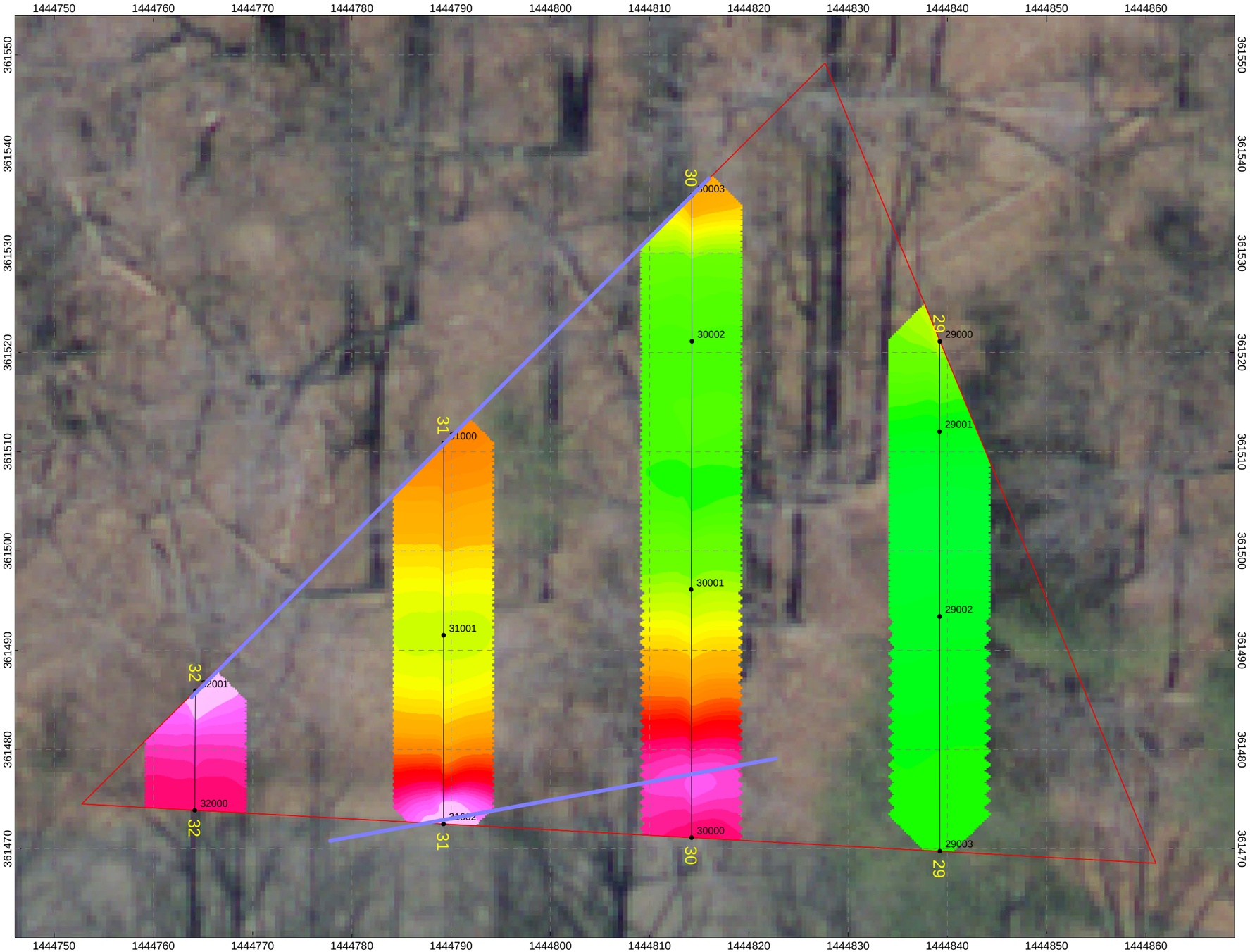
US survey foot

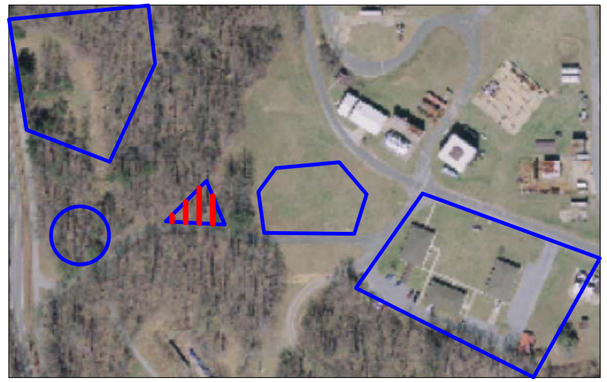
NAD83 / Maryland CS83

Figure 2

Client: CH2M HILL
EM31 Inphase AOC C - Chemical Burial Site 2 Naval Research Laboratory - Chesapeake Bay Detachment Chesapeaske Beach, Maryland
Date of Survey: September 27, 2012 Date of Map Creation: October 1, 2012
Map Approver: J. Guillard

NAEVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys





Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 — Survey Stake (if noted)
- brush — Culture (if noted)
- Interpreted Feature (if noted)

5 0 5 10 15 20
US survey foot
NAD83 / Maryland CS83

Figure 3

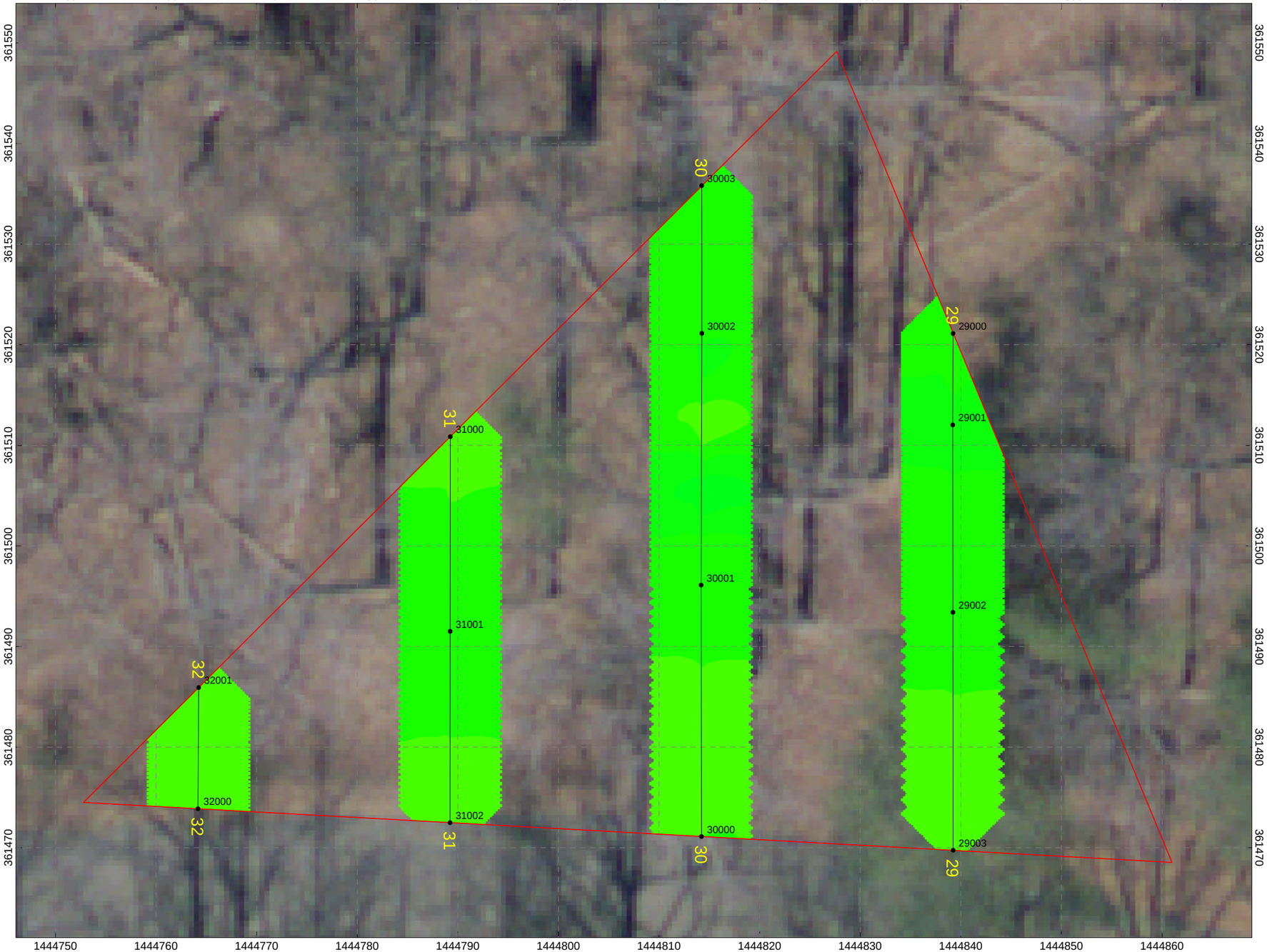
Client: CH2M HILL

EM31 Conductivity
Site 2 - Chemical Burial Site
Naval Research Laboratory - Chesapeake Bay Detachment
Chesapeaske Beach, Maryland

Date of Survey: September 27, 2012
Date of Map Creation: October 1, 2012

Map Approver: J. Guillard

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Subsurface Geophysical Surveys





Legend

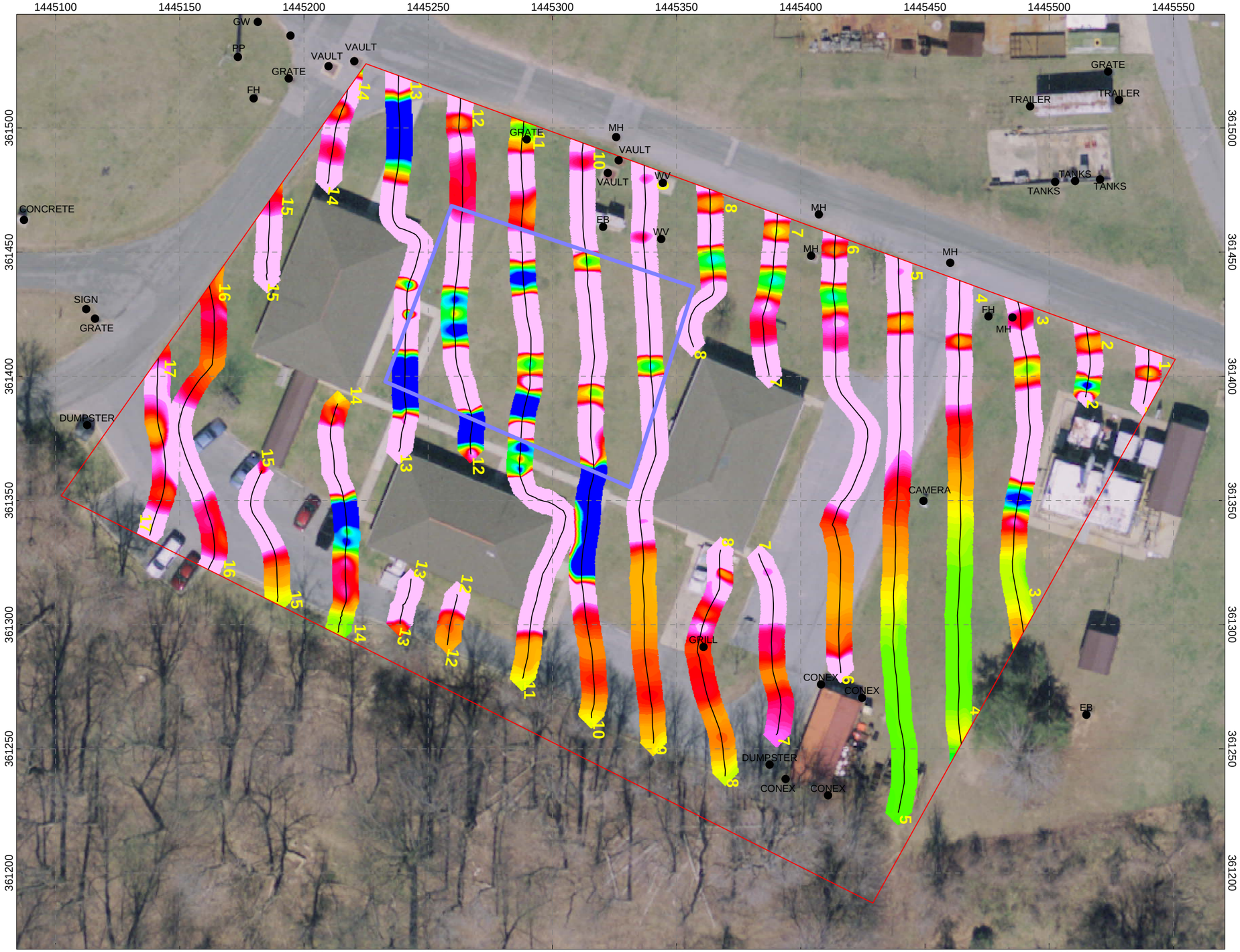
- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 — Survey Stake (if noted)
- brush — Culture (if noted)
- Interpreted Feature (if noted)

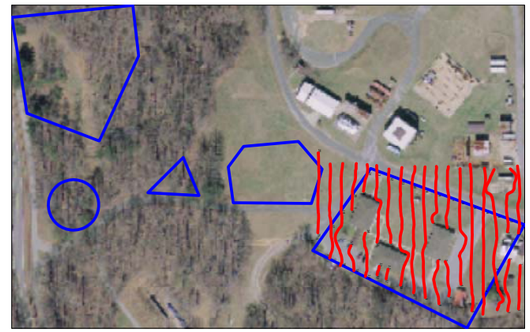
5 0 5 10 15 20
US survey foot
NAD83 / Maryland CS83

Figure 4

Client: CH2M HILL
EM31 Inphase Site 2 - Chemical Burial Site Naval Research Laboratory - Chesapeake Bay Detachment Chesapeaske Beach, Maryland
Date of Survey: September 27, 2012 Date of Map Creation: October 1, 2012
Map Approver: J. Guillard

NAEVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys





Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 — Survey Stake (if noted)
- brush — Culture (if noted)
- Interpreted Feature (if noted)

25 0 25 50 75
US survey foot
NAD83 / Maryland CS83

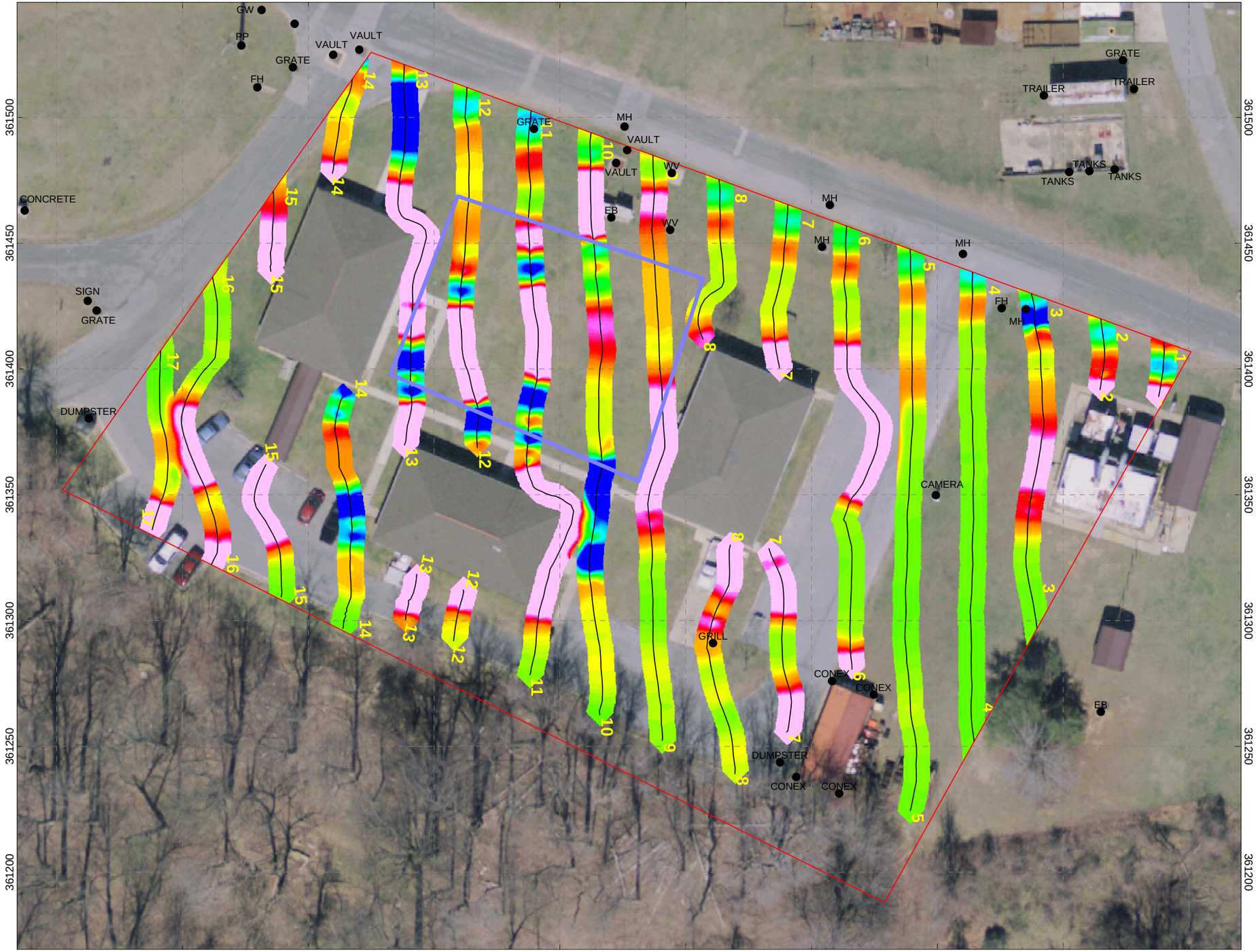
mS/ft
Conductivity

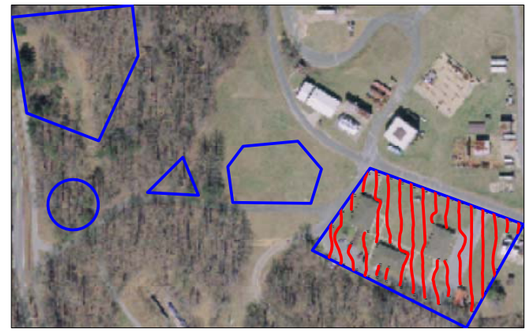
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5 22.0 22.5 23.0 23.5 24.0 24.5 25.0 25.5 26.0 26.5 27.0 27.5 28.0 28.5 29.0 29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0

Figure 5

Client: CH2M HILL
EM31 Conductivity Site 3 - Landfill No. 1 Naval Research Laboratory - Chesapeake Bay Detachment Chesapeake Beach, Maryland
Date of Survey: September 27, 2012 Date of Map Creation: October 1, 2012
Map Approver: J. Guillard

NAEVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys





Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 — Survey Stake (if noted)
- brush — Culture (if noted)
- Interpreted Feature (if noted)

25 0 25 50 75
US survey foot
NAD83 / Maryland CS83

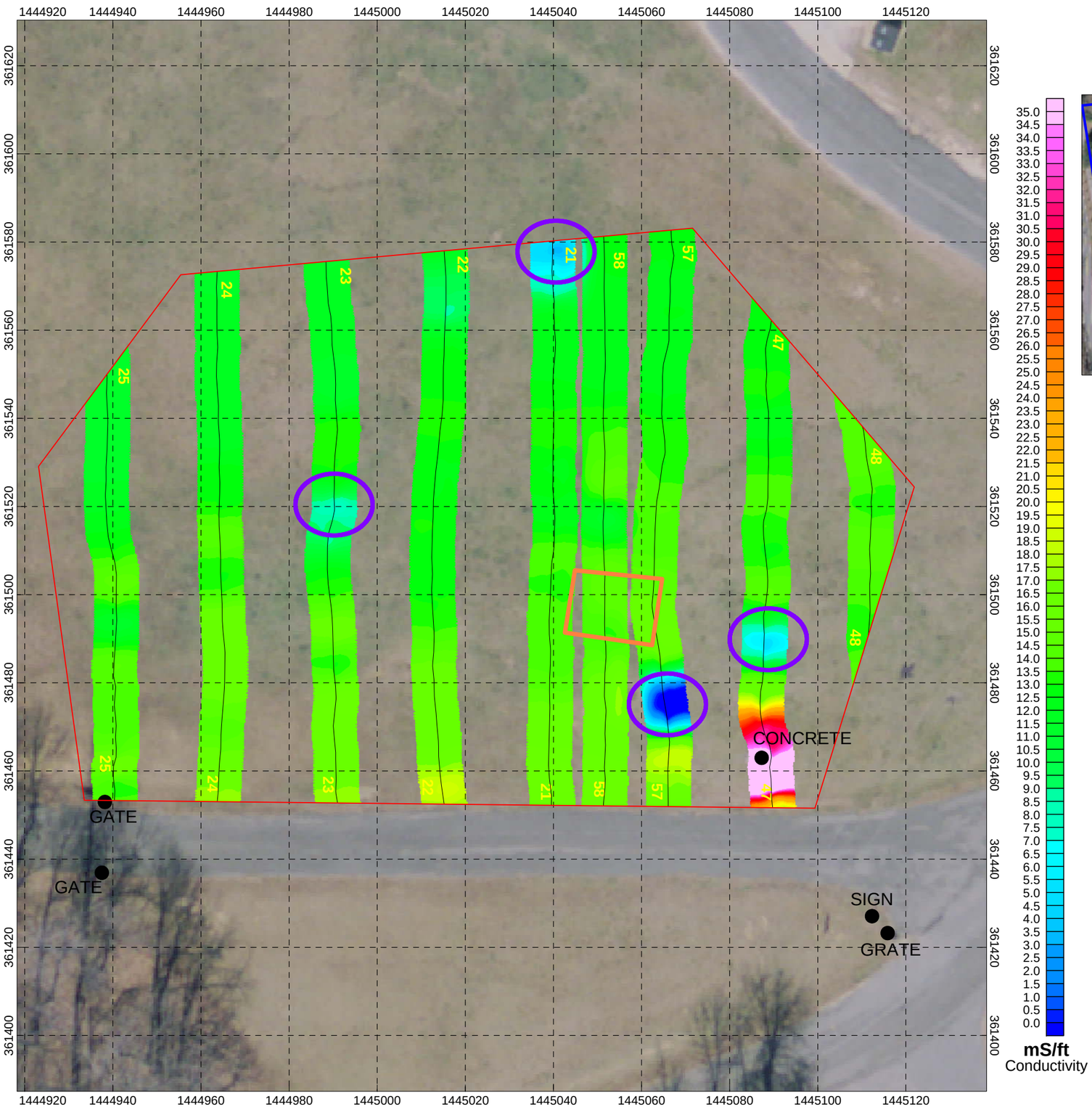
ppt
Inphase

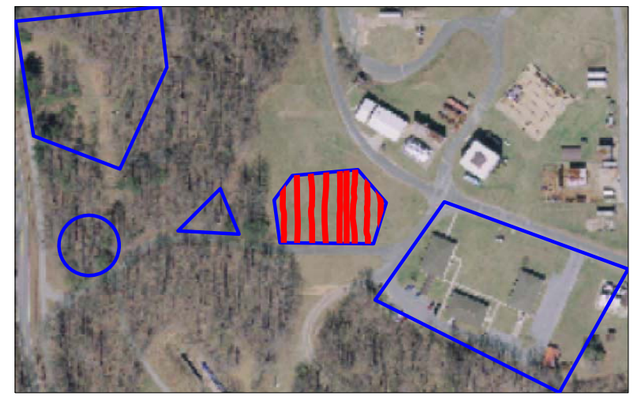
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Figure 6

Client: CH2M HILL
EM31 Inphase Site 3 - Landfill No. 1 Naval Research Laboratory - Chesapeake Bay Detachment Chesapeake Beach, Maryland
Date of Survey: September 27, 2012 Date of Map Creation: October 1, 2012
Map Approver: J. Guillard

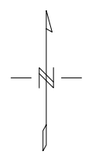
NAEVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys





Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 Survey Stake (if noted)
- brush Culture (if noted)
- Interpreted Feature (if noted)



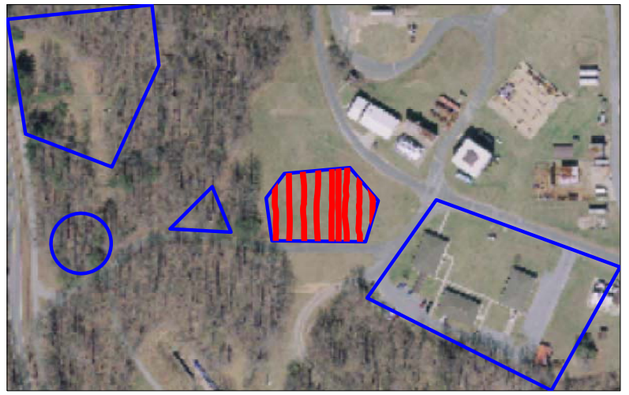
10 0 10 20 30 40 50
US survey foot
NAD83 / Maryland CS83

Figure 7

Client: CH2M HILL
EM31 Conductivity Site 4 - Landfill No. 2 Naval Research Laboratory - Chesapeake Bay Detachment Chesapeaske Beach, Maryland
Date of Survey: September 27, 2012 Date of Map Creation: October 1, 2012
Map Approver: J. Guillard

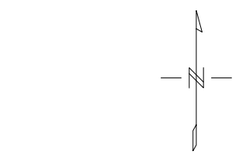
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THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys





Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 Survey Stake (if noted)
- brush Culture (if noted)
- Interpreted Feature (if noted)

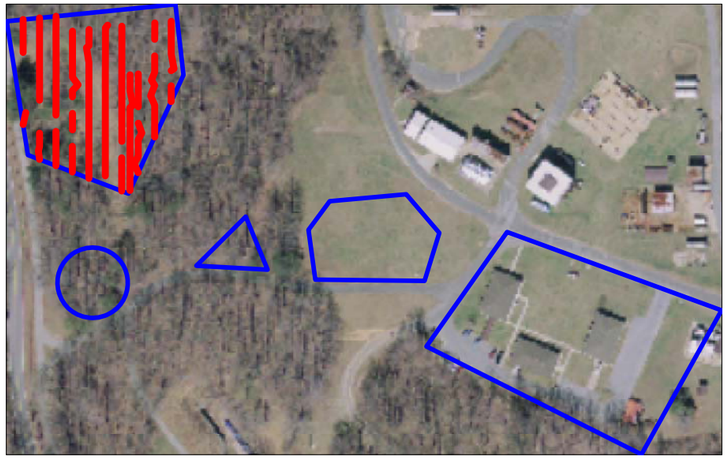


10 0 10 20 30 40 50
US survey foot
NAD83 / Maryland CS83

Figure 8

Client: CH2M HILL
EM31 Inphase Site 4 - Landfill No. 2 Naval Research Laboratory - Chesapeake Bay Detachment Chesapeaske Beach, Maryland
Date of Survey: September 27, 2012 Date of Map Creation: October 1, 2012
Map Approver: J. Guillard

NAEVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys



Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 Survey Stake (if noted)
- brush Culture (if noted)
- Interpreted Feature (if noted)

25 0 25 50 75
US survey foot
NAD83 / Maryland CS83

mS/ft
Conductivity

Figure 9

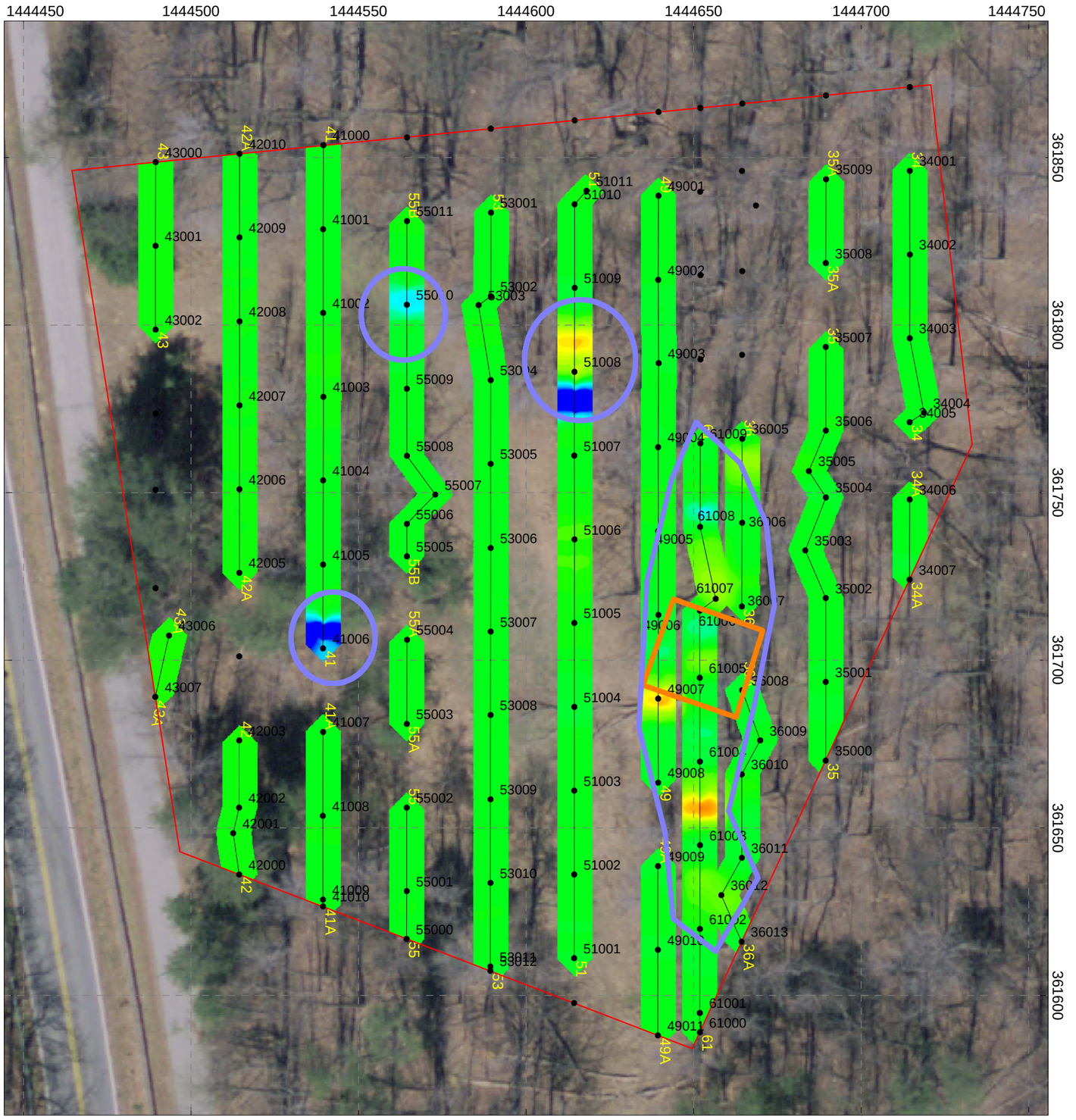
Client: CH2M HILL

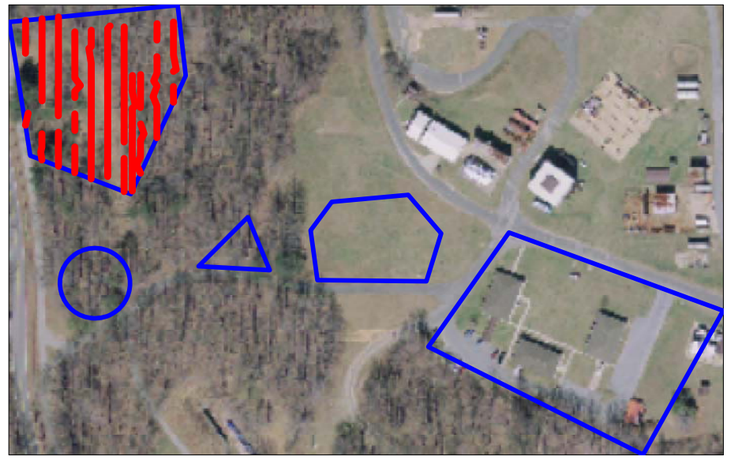
EM31 Conductivity
Site 5 - Landfill No. 3
Naval Research Laboratory - Chesapeake Bay Detachment
Chesapeaske Beach, Maryland

Date of Survey: September 27, 2012
Date of Map Creation: October 1, 2012

Map Approver: J. Guillard

NAEVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys





Legend

- Area of Investigation
- Former Disposal Pit (if noted)
- Transect Path
- 56000 Survey Stake (if noted)
- brush Culture (if noted)
- Interpreted Feature (if noted)

25 0 25 50 75
US survey foot
NAD83 / Maryland CS83

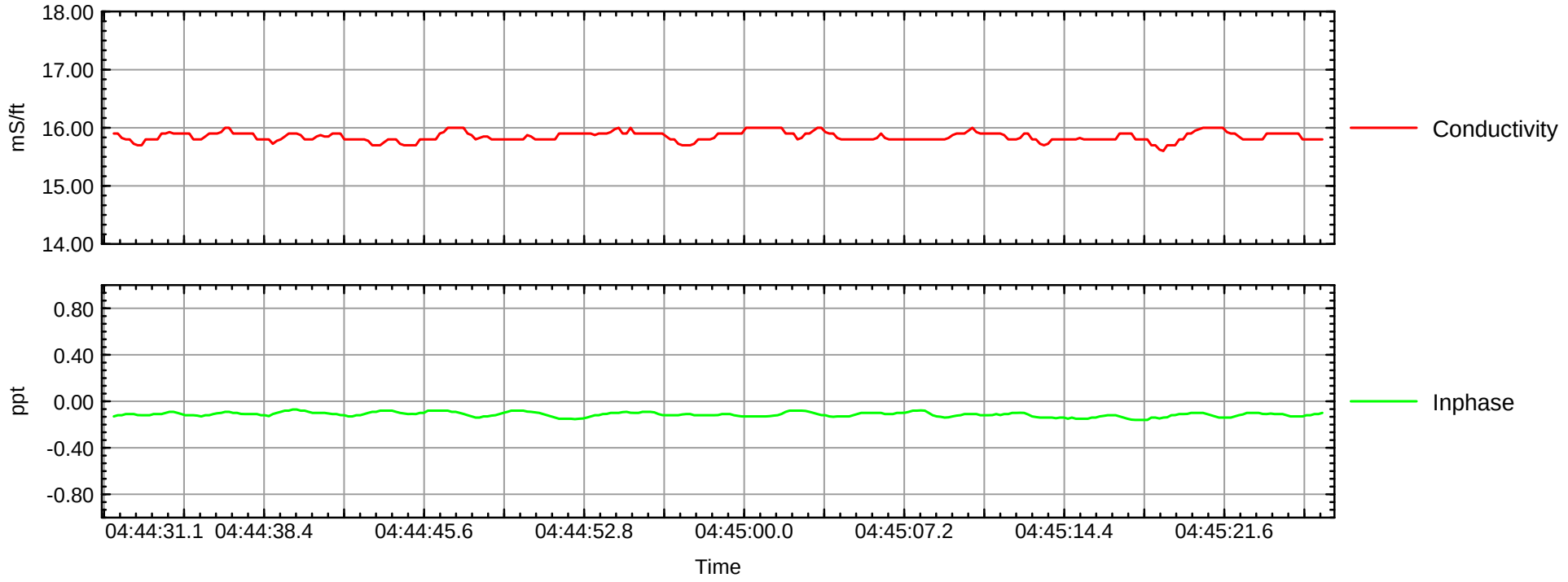
Figure 10

Client: CH2M HILL
EM31 Inphase Site 5 - Landfill No. 3 Naval Research Laboratory - Chesapeake Bay Detachment Chesapeaske Beach, Maryland
Date of Survey: September 27, 2012 Date of Map Creation: October 1, 2012
Map Approver: J. Guillard

Appendix A

QC Tests

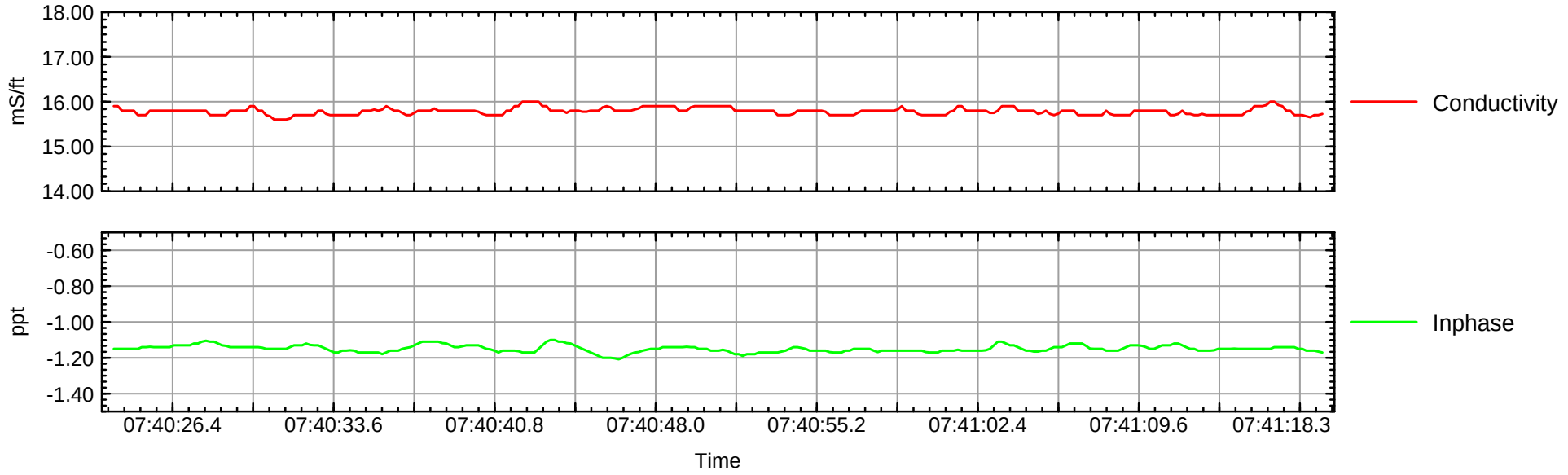
0927QC1 - EM31 Static Test
NRL-CBD, Chesapeake Beach, Maryland



Database: 0927QC1.gdb Line/Group: L0

Date: September 27, 2012

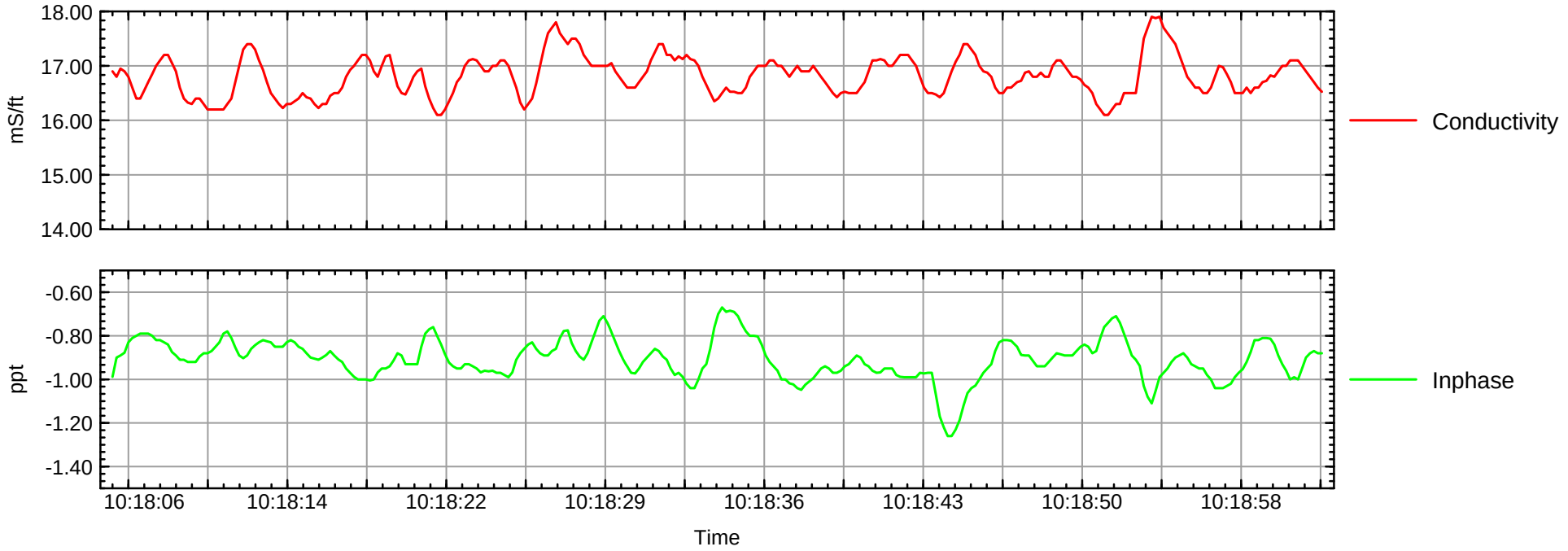
0927QC2 - EM31 Static Test
NRL-CBD, Chesapeake Beach, Maryland



Database: 0927QC2.gdb Line/Group: L0

Date: September 27, 2012

0927QC3 - EM31 Static Test
NRL-CBD Chesapeake Beach, Maryland



Database: 0927QC3.gdb Line/Group: L0

Date: September 27, 2012

Appendix B
Test Pit Photo Log

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 2- Test Pit 1 (near Transect 30)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachn LOCATION NRL_CBD Site 2 LOGGER : E. Curbo

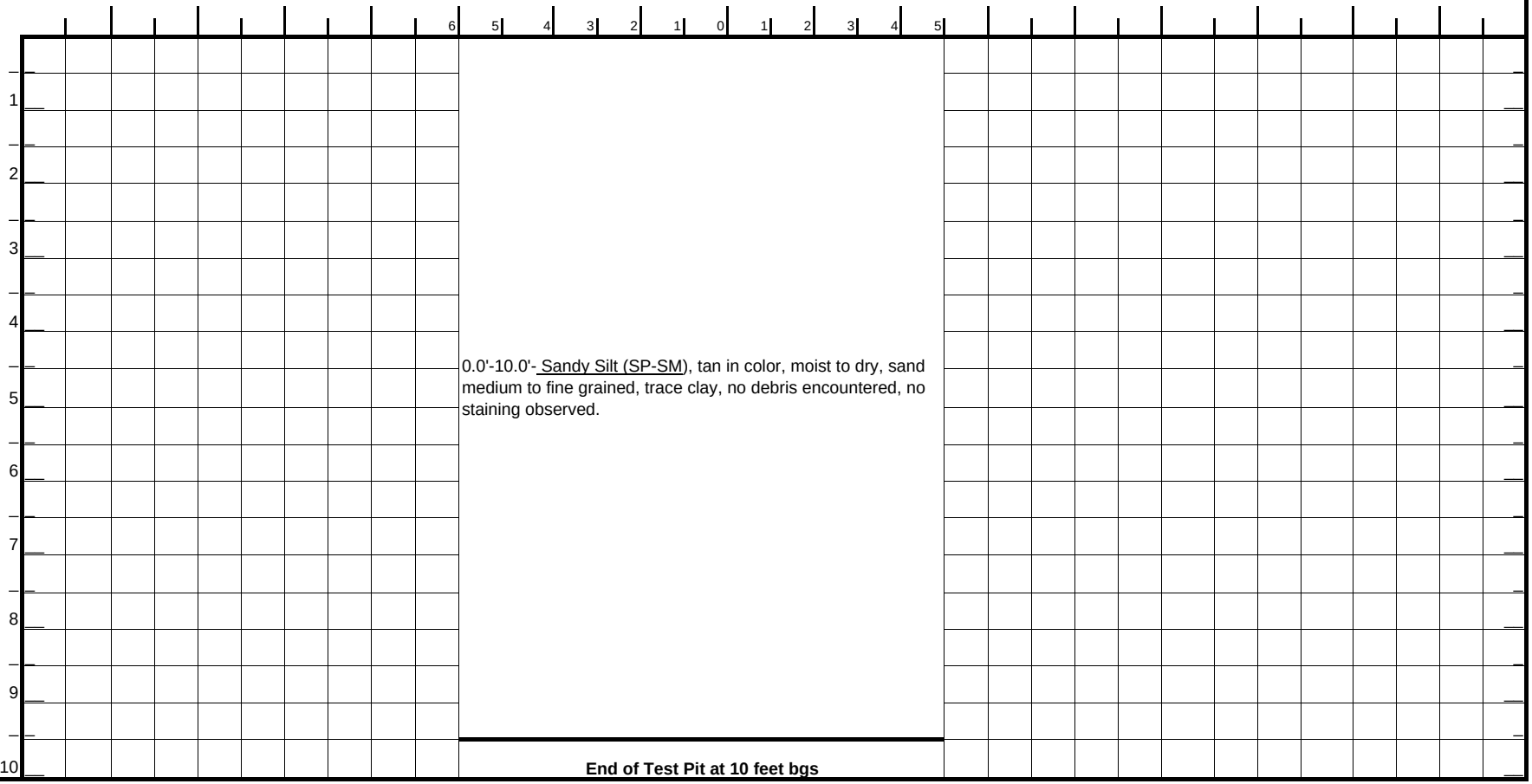
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/09/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 5 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 2- Test Pit 2 (Transect 32)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION NRL_CBD Site 2 LOGGER : E. Curbo

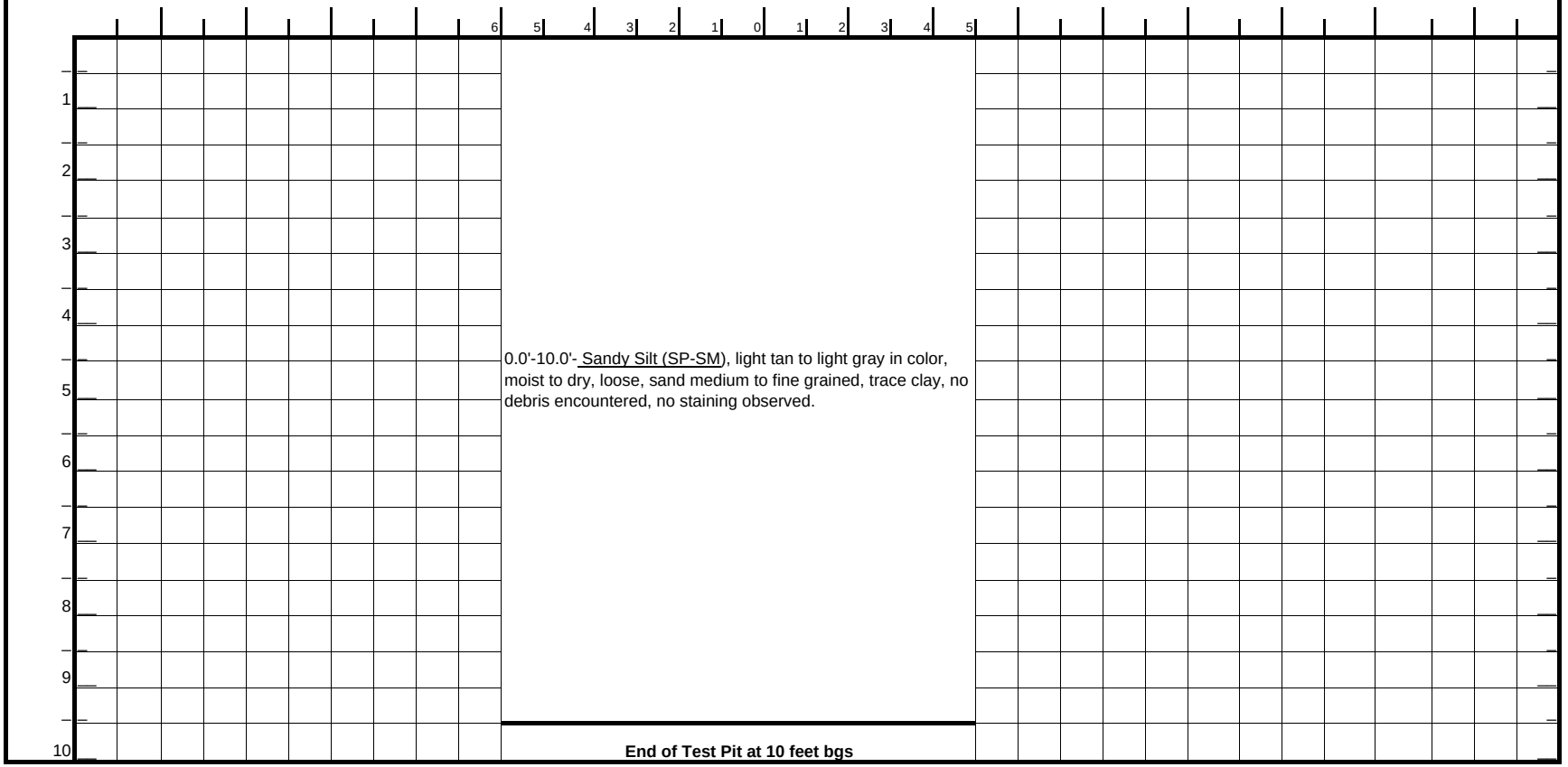
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/09/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 5 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 2- Test Pit 3 (Transect 30)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION NRL_CBD Site 2 LOGGER : E. Curbo

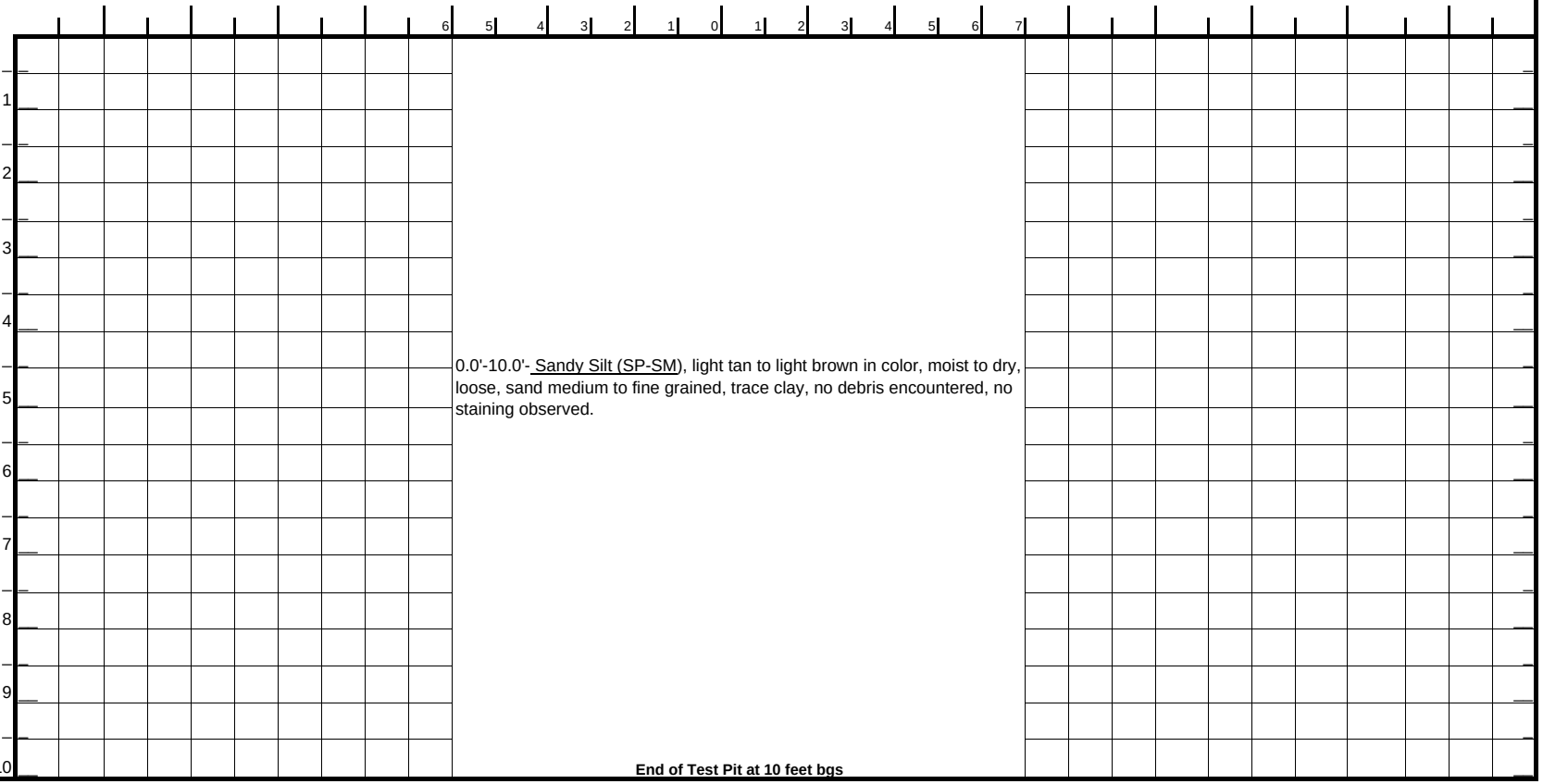
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/09/2012

WATER LEVEL : APPROX. DIMENS: Length: 13 feet Width: 5 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



0.0'-10.0'- Sandy Silt (SP-SM), light tan to light brown in color, moist to dry, loose, sand medium to fine grained, trace clay, no debris encountered, no staining observed.

End of Test Pit at 10 feet bgs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 3- Test Pit 1 (Transect 12)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachm LOCATION : NRL-CBD Site 3 LOGGER : E. Curbo

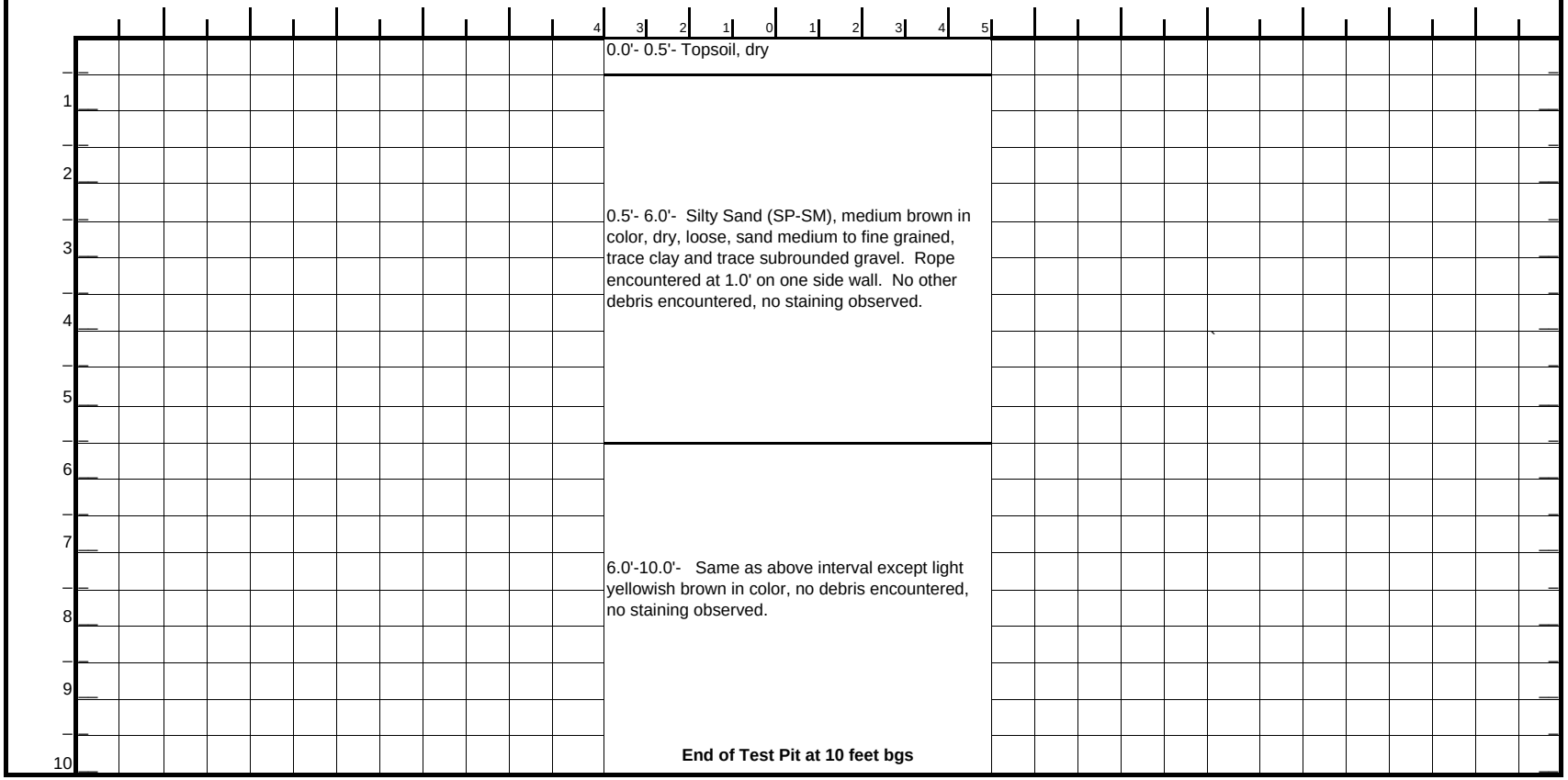
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/11/2012

WATER LEVEL : APPROX. DIMENS: Length: 9 feet Width: 4 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



0.0'- 0.5'- Topsoil, dry

0.5'- 6.0'- Silty Sand (SP-SM), medium brown in color, dry, loose, sand medium to fine grained, trace clay and trace subrounded gravel. Rope encountered at 1.0' on one side wall. No other debris encountered, no staining observed.

6.0'-10.0'- Same as above interval except light yellowish brown in color, no debris encountered, no staining observed.

End of Test Pit at 10 feet bgs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 3- Test Pit 2 (Transect 11)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 3 LOGGER : E. Curbo

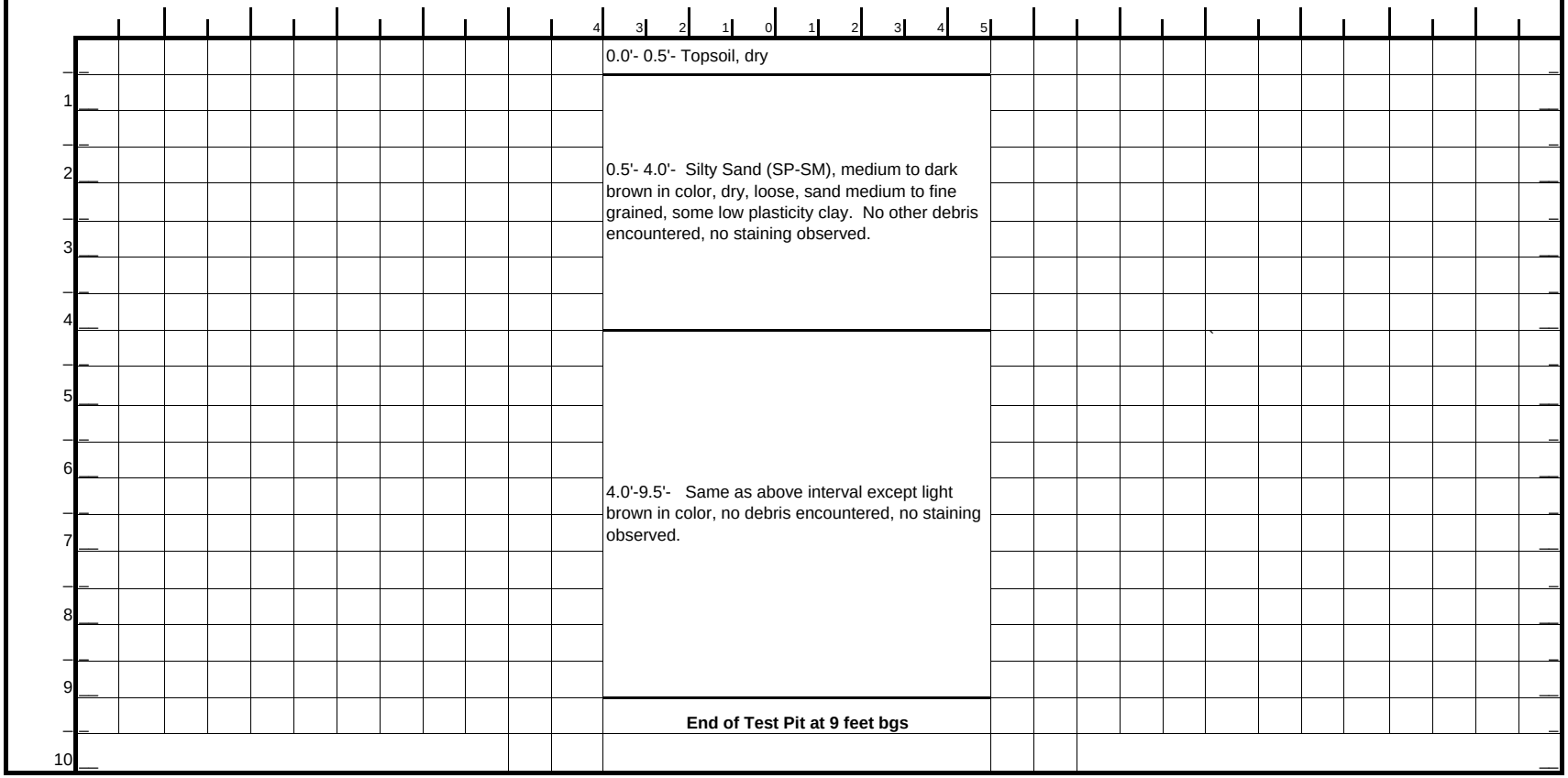
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/11/2012

WATER LEVEL : APPROX. DIMENS: Length: 9 feet Width: 4 feet Max. Depth: 9.5 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 4- Test Pit 1 (Transect 23)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 4 LOGGER : E. Curbo

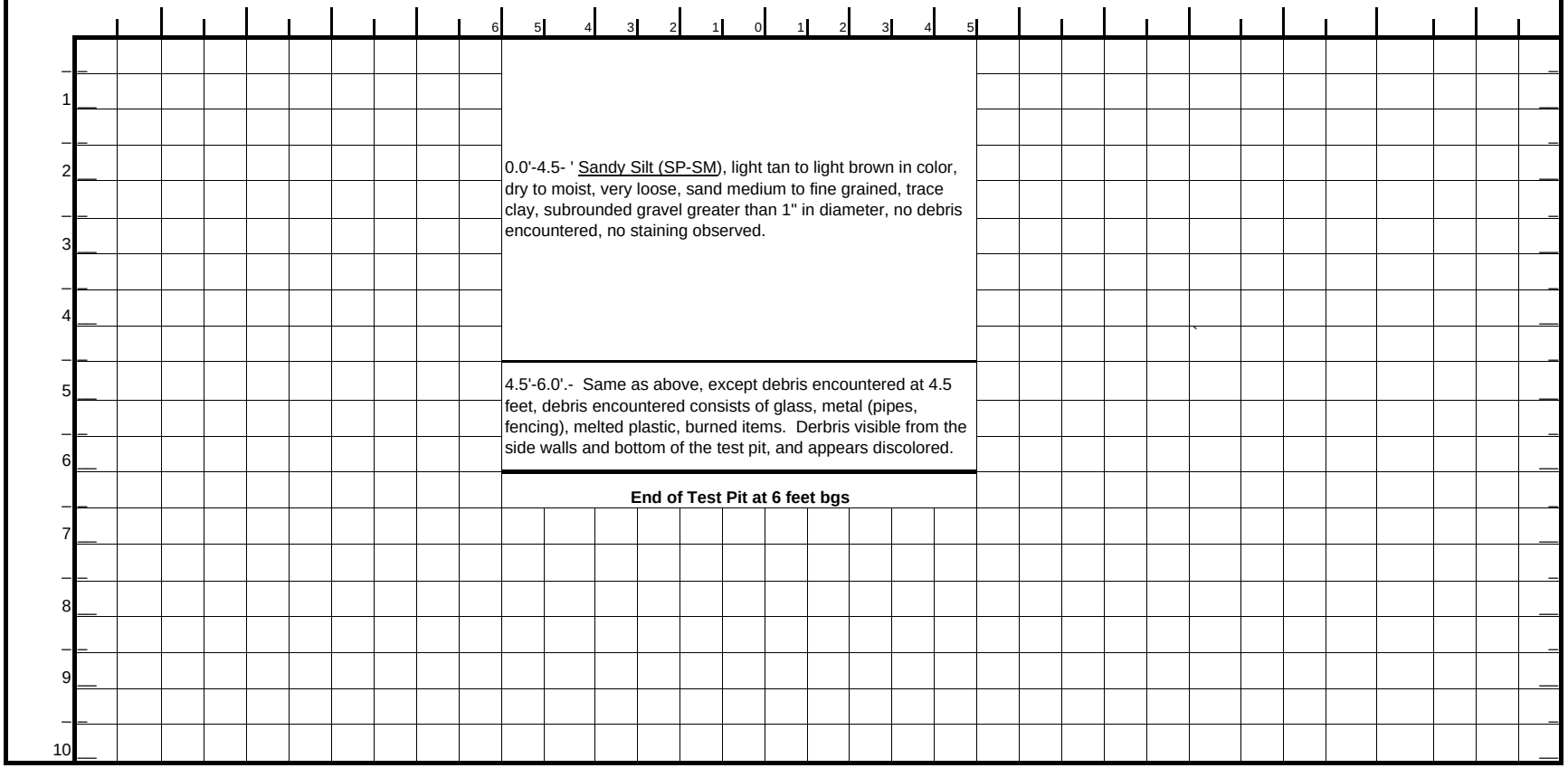
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/10/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 8 feet Max. Depth: 6 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



0.0'-4.5- ' Sandy Silt (SP-SM), light tan to light brown in color, dry to moist, very loose, sand medium to fine grained, trace clay, subrounded gravel greater than 1" in diameter, no debris encountered, no staining observed.

4.5'-6.0'.- Same as above, except debris encountered at 4.5 feet, debris encountered consists of glass, metal (pipes, fencing), melted plastic, burned items. Derbris visible from the side walls and bottom of the test pit, and appears discolored.

End of Test Pit at 6 feet bgs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 4- Test Pit 2 (Transect 58)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 4 LOGGER : E. Curbo

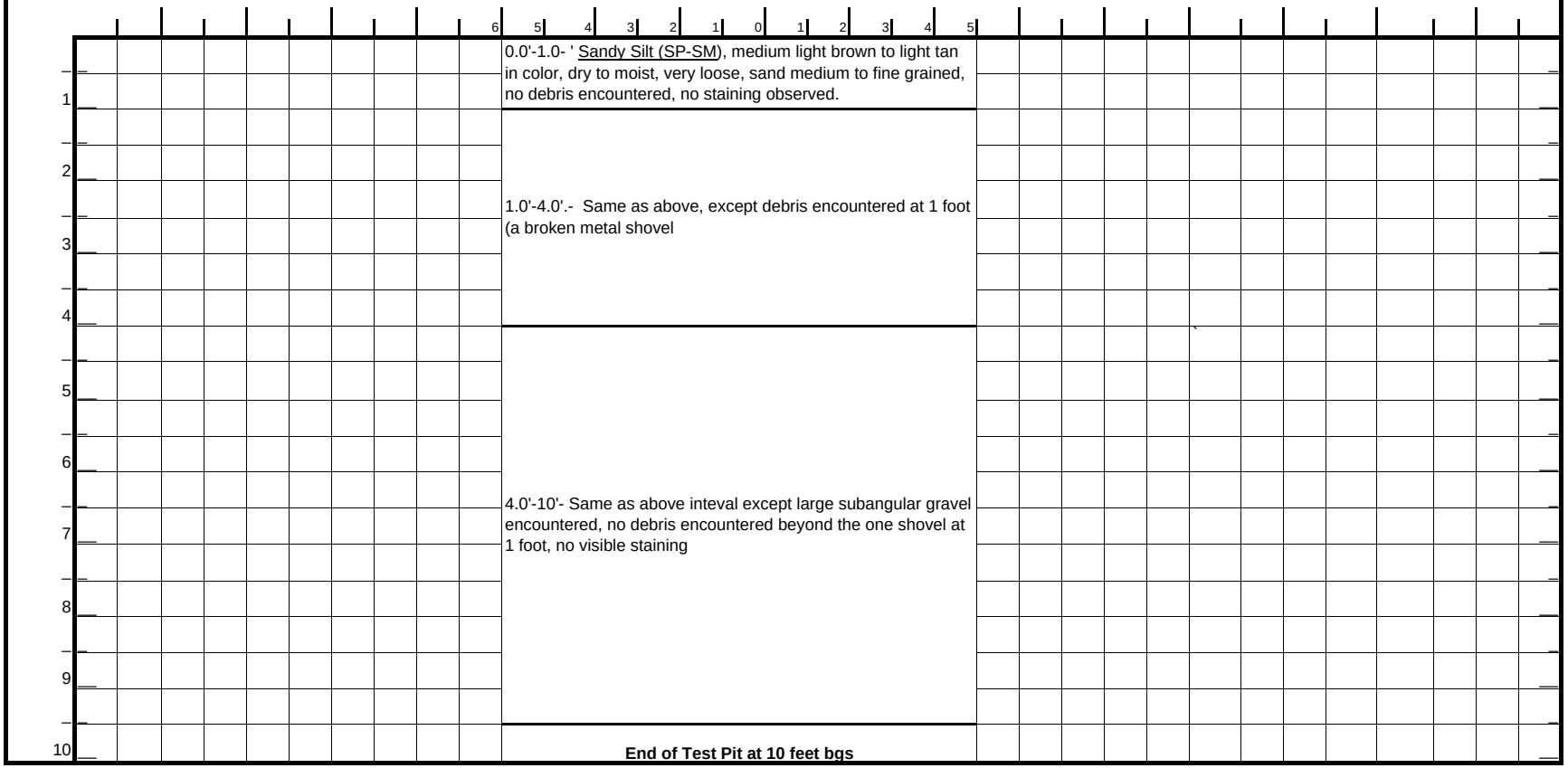
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/10/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 6 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 4- Test Pit 3 (Transect 57)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 4 LOGGER : E. Curbo

ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/09/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 5 feet Max. Depth: 6 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)

6 5 4 3 2 1 0 1 2 3 4 5

0.0'-1.0'- Sandy Silt (SP-SM), light tan to light brown in color, moist to dry, loose, sand medium to fine grained, trace clay, no debris encountered, no staining observed.

1.0'-6.0'- Debris at 1 foot, consists of wires, glass, brick, burned wood, metal. Color change ooccurs at 6 feet, soil is black.

End of Test Pit at 6 feet bgs

1 2 3 4 5 6 7 8 9 10

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 4- Test Pit 4 (Transect 47)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 4 LOGGER : E. Curbo

ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/10/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 5 feet Max. Depth: 8.5 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)

6 5 4 3 2 1 0 1 2 3 4 5

0'-0.6- Topsoil, dry

0.6-2.0' Sandy Silt (SP-SM), light brown in color, moist to dry, loose, sand medium to fine grained, trace clay, no debris encountered, no staining observed.

2'-5.0- Same as above, except debris encountered at 2 foot, consists metal

5.0-8.5'- Same as above except light yellow in color, debris encountered consisting of red and black brick, metal, part of a shovel, gravel greater than 4" in diameter, debris visible in the side wall of the trench.

End of Test Pit at 8.5 feet bgs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 4- Test Pit 5 (Transect 21)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 4 LOGGER : E. Curbo

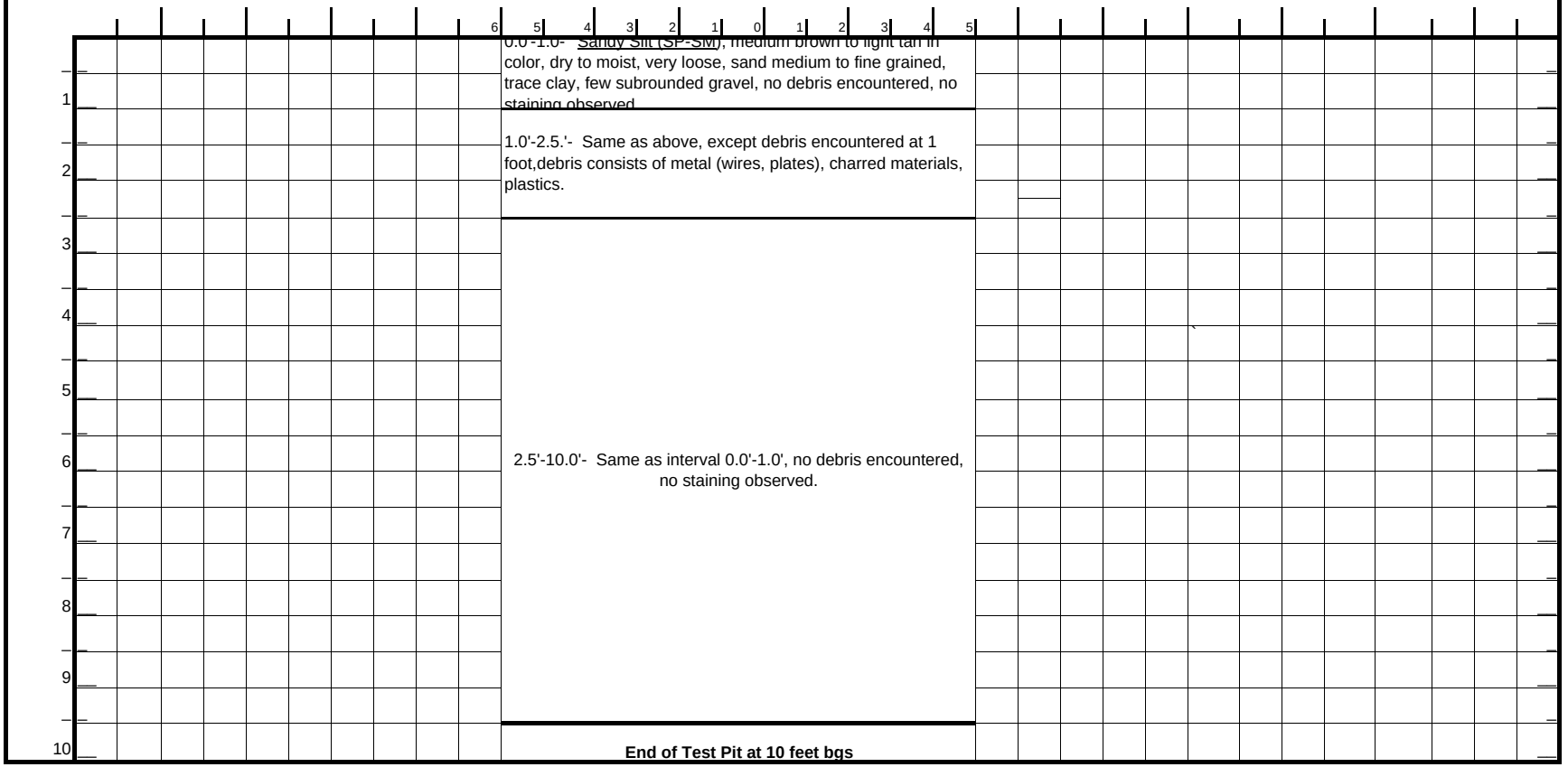
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/10/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 8 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 5- Test Pit 1 (Transect 41A)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 5 LOGGER : E. Curbo

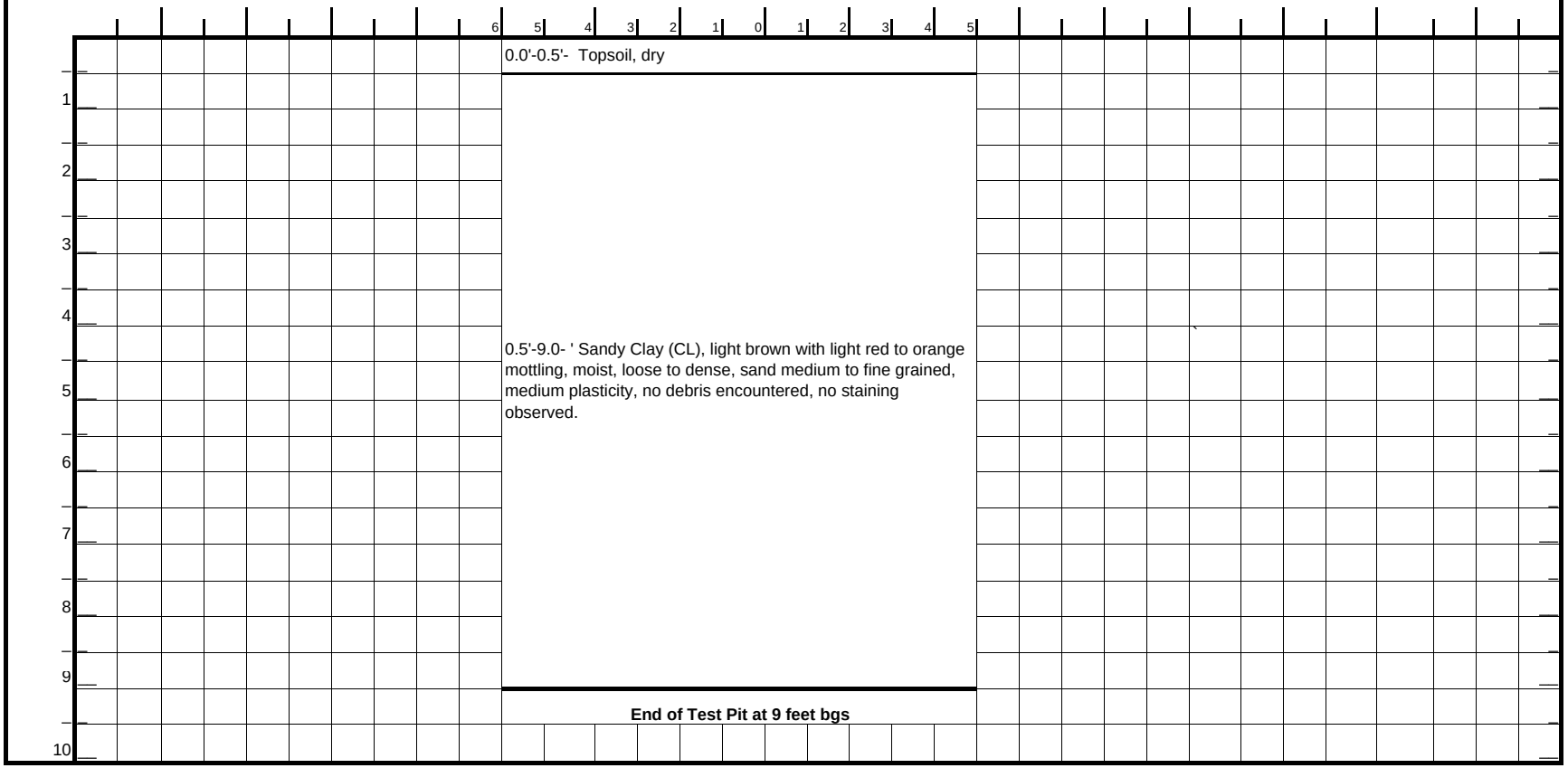
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/10/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 5 feet Max. Depth: 9 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



0.0'-0.5'- Topsoil, dry

0.5'-9.0- ' Sandy Clay (CL), light brown with light red to orange mottling, moist, loose to dense, sand medium to fine grained, medium plasticity, no debris encountered, no staining observed.

End of Test Pit at 9 feet bgs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 5- Test Pit 2 (Transect 55A)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 5 LOGGER : E. Curbo

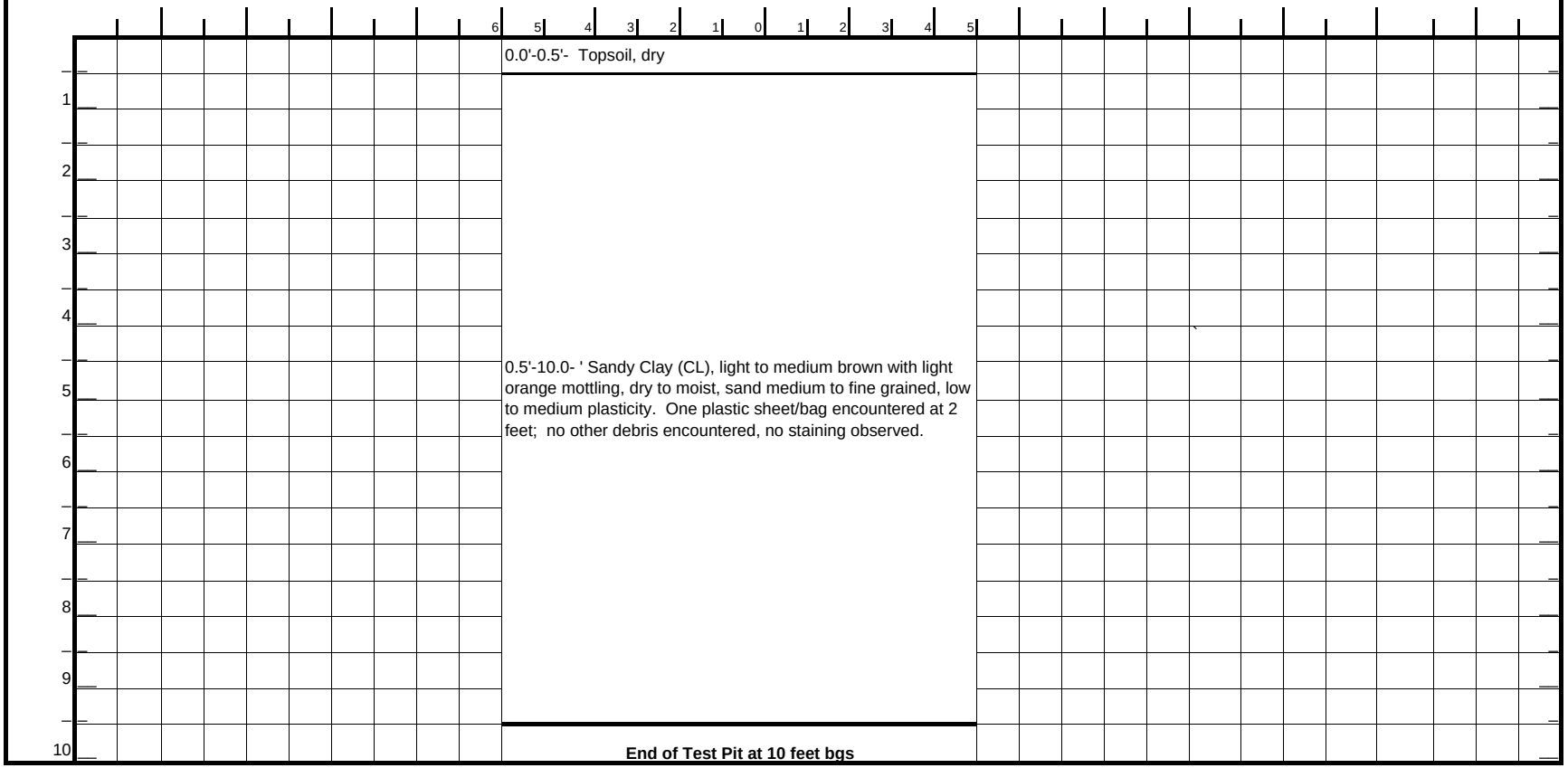
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/10/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 5 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 5- Test Pit 3 (Transect 61-in box)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 5 LOGGER : E. Curbo

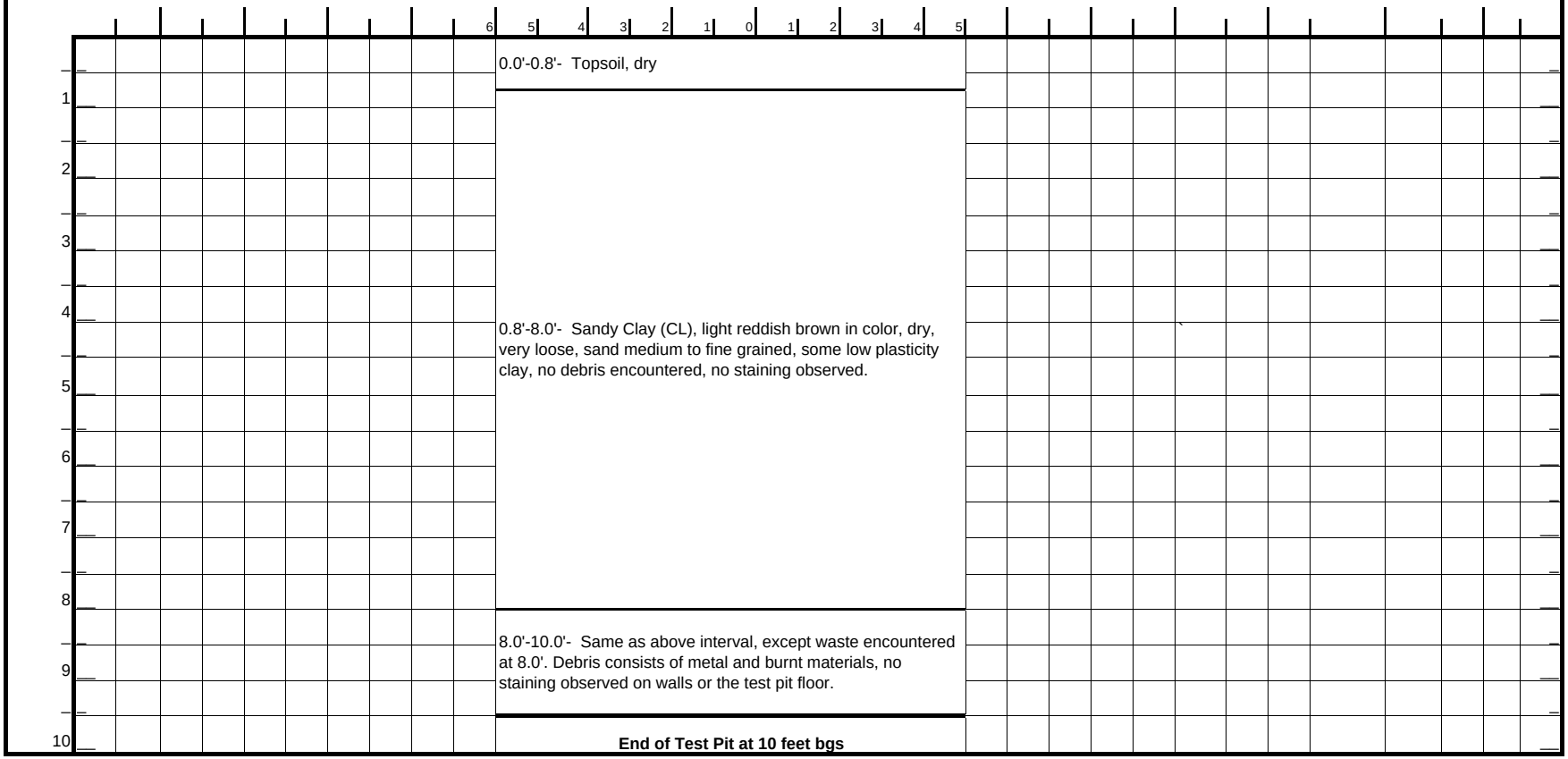
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/10/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 5 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



0.0'-0.8'- Topsoil, dry

0.8'-8.0'- Sandy Clay (CL), light reddish brown in color, dry, very loose, sand medium to fine grained, some low plasticity clay, no debris encountered, no staining observed.

8.0'-10.0'- Same as above interval, except waste encountered at 8.0'. Debris consists of metal and burnt materials, no staining observed on walls or the test pit floor.

End of Test Pit at 10 feet bgs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 5- Test Pit 4 (Transect 61-outside box)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 5 LOGGER : E. Curbo

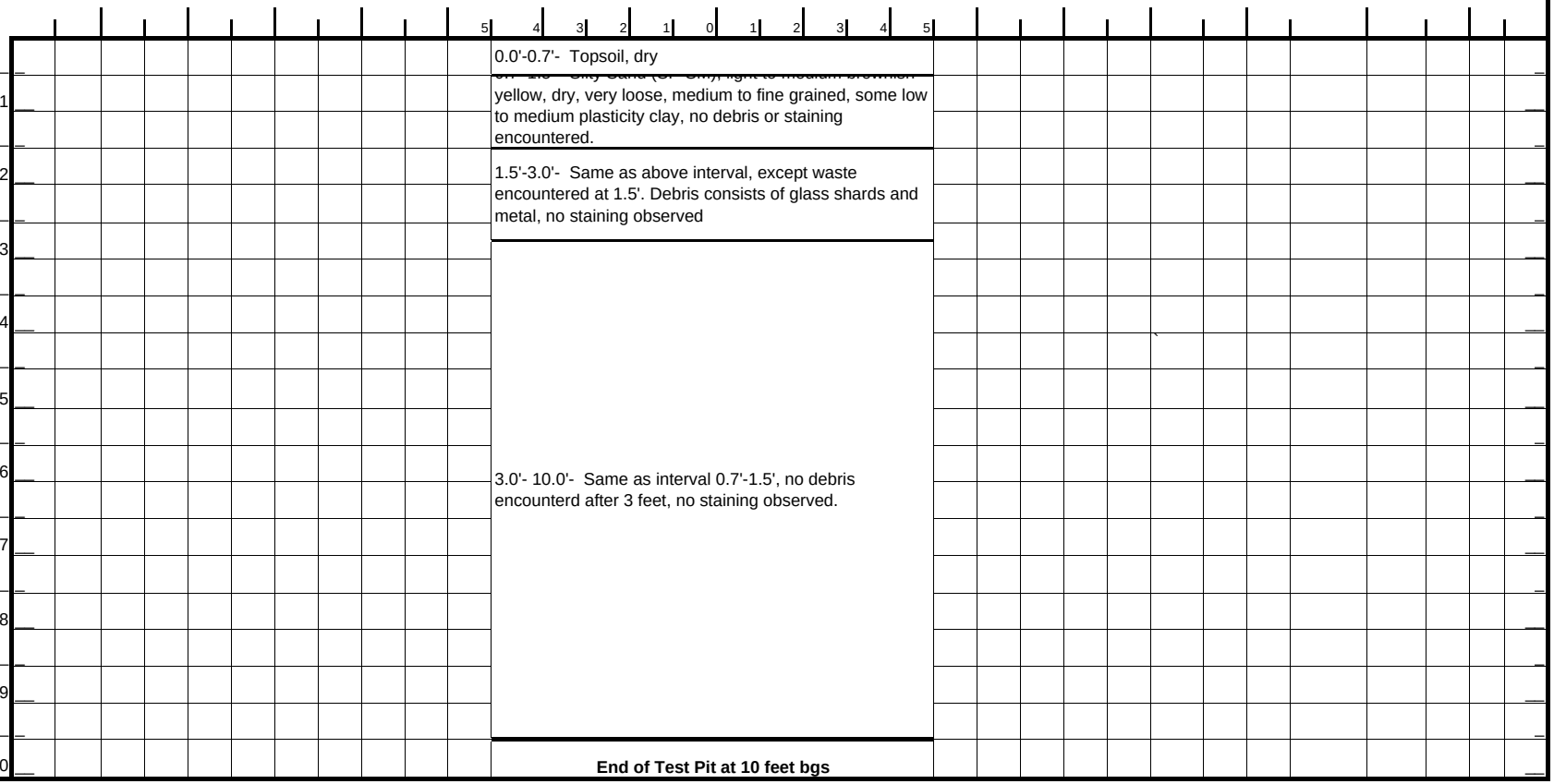
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/10/2012

WATER LEVEL : APPROX. DIMENS: Length: 10 feet Width: 5 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



0.0'-0.7'- Topsoil, dry

0.7'-1.5'- Silty Sand (SP-SM), light to medium brownish yellow, dry, very loose, medium to fine grained, some low to medium plasticity clay, no debris or staining encountered.

1.5'-3.0'- Same as above interval, except waste encountered at 1.5'. Debris consists of glass shards and metal, no staining observed

3.0'- 10.0'- Same as interval 0.7'-1.5', no debris encounterd after 3 feet, no staining observed.

End of Test Pit at 10 feet bgs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 5- Test Pit 5 (Transect 51)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 5 LOGGER : E. Curbo

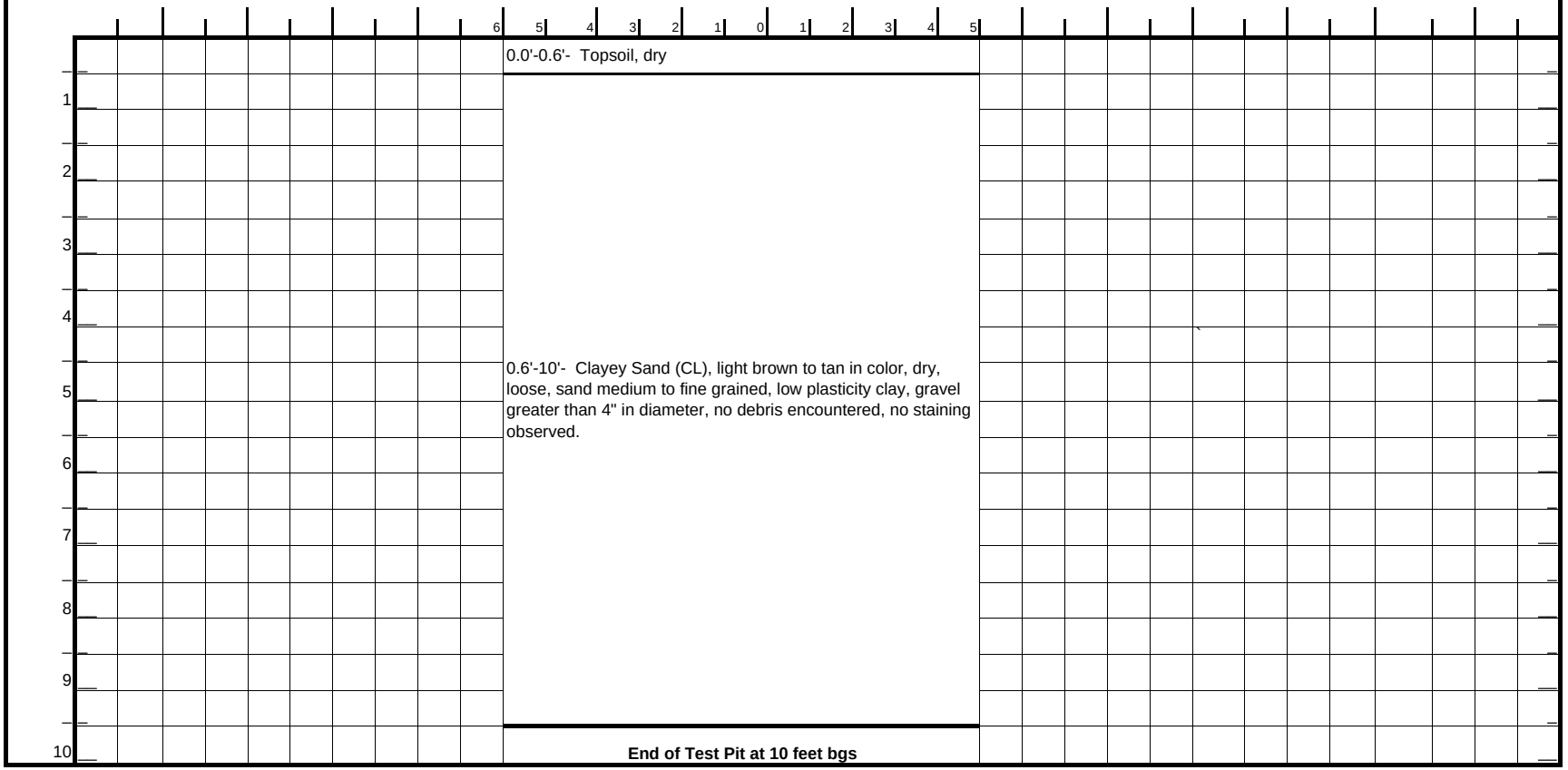
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/11/2012

WATER LEVEL : APPROX. DIMENS: Length: 11 feet Width: 5 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



0.0'-0.6'- Topsoil, dry

0.6'-10'- Clayey Sand (CL), light brown to tan in color, dry, loose, sand medium to fine grained, low plasticity clay, gravel greater than 4" in diameter, no debris encountered, no staining observed.

End of Test Pit at 10 feet bgs

CH2MHILL

PROJECT NUMBER	TEST PIT NUMBER	
423675.FI.MS	Site 5- Test Pit 6 (Transect 53)	SHEET 1 of 1

TEST PIT LOG

PROJECT: Naval Research Laboratory- Chesapeake Bay Detachr LOCATION : NRL-CBD Site 5 LOGGER : E. Curbo

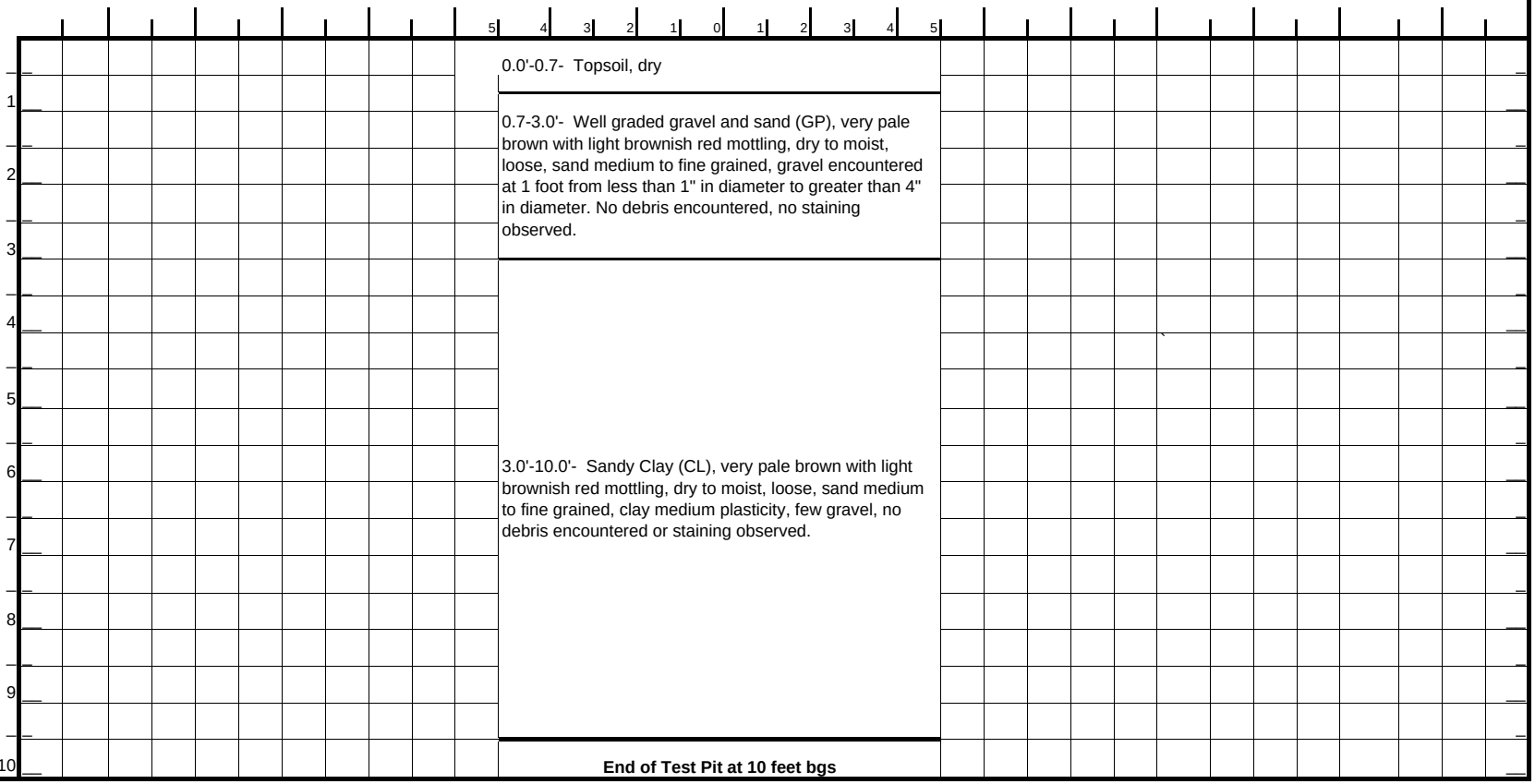
ELEVATION : CONTRACTOR Ground Zero

EXCAVATION EQUIPMENT USED : Back-Hoe DATE EXCAVATED: 10/11/2012

WATER LEVEL : APPROX. DIMENS: Length: 10 feet Width: 5 feet Max. Depth: 10 feet

DESCRIPTION	COMMENTS
SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	DIFFULCULTY IN EXCAVATION, RUNNING GRAVEL, CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, GRADATIONAL CONTACTS, TESTS, INSTRUMENTS, WATER SEEPAGE

TEST PIT DIMENSIONS (FT)



0.0'-0.7- Topsoil, dry

0.7-3.0'- Well graded gravel and sand (GP), very pale brown with light brownish red mottling, dry to moist, loose, sand medium to fine grained, gravel encountered at 1 foot from less than 1" in diameter to greater than 4" in diameter. No debris encountered, no staining observed.

3.0'-10.0'- Sandy Clay (CL), very pale brown with light brownish red mottling, dry to moist, loose, sand medium to fine grained, clay medium plasticity, few gravel, no debris encountered or staining observed.

End of Test Pit at 10 feet bgs

Test Pit Photo Log- Naval Research Laboratory-Chesapeake Bay Detachment, October 2012



Site 4- Test Pit with debris visible on pile. Debris encountered at 2 feet, debris including metal, brick, and part of a shovel.



Site 4 Test Pit with debris visible in the sidewall. Debris encountered at 4.5 feet with glass, metal pipes and fencing, melted plastic and burned items visible.



Site 4 Test Pit with debris visible in the side wall



Site 5 Test Pit with debris visible. Debris encountered at 1.5 feet. Debris consisted of glass shards and metal.

Appendix C
Soil Boring Logs

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 2 NRL-CBD-DP01

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/15/12 END : 10/15/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	50			0"-6" - Topsoil, moist 6"-26"- Clayey Sand (SC), yellowish brown (10YR 5/6), moist, firm, sand medium to fine grained, clay low-medium plasticity 26"-36"- Same as above, except strong brown (7.5 YR 7/8) 36-50" - Fat Clay (CH) with sand reddish yellow (7.5 YR 6/6), moist, firm, sand medium to fine, clay medium plasticity	Collect Sample CBD-S02-SS01-1012- 15:10 Collect Sample CBD-S02-SS01-1012-MS-15:10 Collect Sample CBD-S02-SS01-1012-SD- 15:10
5	5-10	56			0"-21" - Same as above interval 21"-56"- Sandy lean clay (CL), pale brown (10YR 6/3), moist, firm, sand medium to fine grained, clay low-medium plasticity	
10	10-15	52			0"-24" - Same as above interval 24"-32"- Same as above interval, except brownish yellow mottling (10YR 6/8) 32"- 38"- Fat Clay with sand (CL), pale brown (10YR 6/3), moist, firm, dense, sand medium to fine grained, clay medium plasticity 38"- 52"- Poorly Graded Sand (SP), strong brown (7.5 YR 5/8) with pale brown mottling (10 YR 6/3), moist, loose	
15	15-20	42			0"-7" - Clayey Sand (SC), plae brown (10YR 6/3), moist, soft, sand medium to fine grained, clay low plasticity 7-13"- Fat Clay with sand (CH), pale brown (10YR 6/3), moist, firm, dense, sand medium to fine grained, clay medium plasticity 13"- 42"- Poorly Graded Sand (SP), reddish yellow (10 YR 6/8) moist, loose, soft, sand medium to fine grained	
20	20-25	46			0"-19" - Same as above interval 19"-41" Same as above interval, execept brownish yellow (10YR 6/6) 41"- 46"- Same as above inteval, except brownish yellow (10 YR 6/8)	
25	25-30	55			0"-21" - Poorly Graded Sand (PG), strong brown (7.5 YR 5/8), moist, loose, soft, sand medium to fine grained 21"-36" - Same as above interval, execept brownish yellow (10YR 6/8) 36"- 55"- Same as above inteval, except brownish yellow (10 YR 6/6), and wet	Collect Sample CBD-S02-SB01-2628- 15:50 Collect Sample CBD-S02-SB01P-2628 - 15:55
30					End of Boring at 30' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 2 NRL-CBD-DP02

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/15/12 END : 10/15/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	43			0"-6" - Topsoil, dry 6"-17"- Clayey Sand (SC), yellowish brown (10YR 5/6), dry, medium denisty, sand medium to fine grained, trace subangular gravel 17"-37"- Poorly Graded Sand with gravel (SP), yellow (10YR 7/6), dry, loose, sand medium to fine grained, gravel subrounded 37"-43"- Same as above interval except brownish yellow (10 YR 6/8)	Collect Sample CBD-S02-SS02-1012- 11:10
5	5-10	60			0"-60" - Poorly Graded Sand with trace gravel and clay (SP-SC), brownish yellow (10 YR 7/8) with yellowish brown mottling (10 YR 5/8), dry, sand medium to fine grained, clay low plasticity, gravel sub-rounded	
10	10-15	46			0"-12" - Same as above interval 12"-16"- Pooly Graded Sand (SP), stong brown (7.5 YR 5/8), dry, very loose, sand medium to fine grained 16"- 23"- Same as above interval, except light gray (7.5 YR 7/1) 23"- 25"- Same as above interval, excpet strong brown (7.5 YR 5/8) 25"-35"- Same as above inverval, except light gray (7.5 YR 7/1) with strong brown mottling (7.5 YR 5/8) 35"- 46"- Same as above interval, except yellowish brown (10 YR 6/8)	
15	15-20	43			0"-31" - Poorly Graded Sand with Gravel (SP), brownish yellow (10YR 6/8), moist, loose, sand medium to fine grained, gravel subrounded 31"-43" - Poorly Graded Sand (PG), yellow (10 YR 7/8), moist, very loose, sand medium to fine grained	x
20	20-25	36			0"-19" - Same as above interval 19"-25" - Same as above interval, except reddish yellow (7.5 YR 7/8) 25"- 36"- Same as interval 0"-19"	
25	25-30	40			0"-16" - Poorly Graded Sand (PG) with gravel, strong brown (7.5 YR 5/8), moist, loose, sand medium to fine grained, gravel subrounded 16"-24" - Poorly Graded Sand (PG), yellow (10YR 6/8), wet, loose, sand medium to fine grained 24"- 40"- Same as above inteval, except light gray (10 YR 7/1)	Collect Sample CBD-S02-SB01-2426-12:10
30					End of Boring at 30' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 2 NRL-CBD-DP03

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/15/12 END : 10/15/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	49			0"-6" - Topsoil, moist 6"-49"- Poorly Graded Sand and Gravel (SP), strong brown (7.5YR 5/8), dry, sand medium to fine grained, gravel subrounded, trace clay, low plasticity	Collect Sample CBD-S02-SS03-1012- 09:55
5	5-10	60			0"-28" - Poorly Graded Sand (SP), strong brown (7.5 YR 5/8), dry, medium density, sand medium to fine grained, some low plasticity clay 28"-60"- Same as above interval, except light gray (10 YR 7/1) and moist.	
10	10-15	55			0"-37" - Poorly Graded Sand (SP), light gray (10YR 7/1) with mottling strong brown (7.5 YR 5/8), moist, soft, loose, sand medium to fine grained, little clay 37"-47"- Same as above interval, except few subrounded gravel 47"- 55"- Poorly Graded Sand (SP), strong brown (7.5 YR 5/8), moist, very loose, sand medium to fine grained	
15	15-20	36			0"-36" - Same as interval above, except reddish yellow (7.5YR 6/8)	
20	20-25	33			0"-33" - Same as above interval, except yellow (10YR 7/8)	
25	25-30	36			0"-36" - Poorly Graded Sand (PG), yellow (10YR 7/8), moist to wet, loose, soft, sand medium to fine grained	Collect Sample CBD-S02-SB03-2830-10:40
30					End of Boring at 30' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 2 NRL-CBD-DP04

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/15/12 END : 10/15/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	49			0"-7" - Topsoil, dry 7"-24"- Poorly Graded Sand (SP), strong brown (7.5YR 5/8), dry, loose, sand medium to fine grained 24"-49"- Poorly Graded Sand and Gravel (SP), reddish yellow (7.5YR 6.8), dry, loose, sand medium to fine grained, gravel subrounded	Collect Sample CBD-S02-SS04-1012- 13:45
5	5-10	60			0"-36" - Poorly Graded Sand (SP), yellowish brown (10YR 6/8), dry, firm, sand medium to fine grained, some low plasticity clay 36"-43"- Poorly Graded Sand (SP), yellowish brown (10YR 6/8), dry, very loose, sand medium to fine grained. "43-"60"- Same as interval 0"-36".	
10	10-15	53			0"-48" - Clayey Sand (SC), yellowish brown (10YR 6/8) with light gray mottling (10YR 7/2), dry, firm, sand medium to fine grained, clay low plasticity 48"-55"- Poorly Graded Sand (SP), light gray (10YR 7/2), dry, very loose, sand medium to fine grained	
15	15-20	48			0"-8" - Same as interval above, except moist 8"-25"- Same as above interval, except strong brown (7.5YR 5/8) 25"-26"- Same as interval above, except black (10YR 2/1) 26"-31"- Same as above interval, except brownish yellow (10YR 6/8) 31"-37"- Same as interval 8"-25" 37"-48"- Same as interval 26"-31"	
20	20-25	48			0"-48" - Poorly Graded Sand (PG), yellow (10YR 7/8), moist, very loose, soft, sand medium to fine grained	
25	25-30	45			0"-33" - Same as above interval 33"- 42"- Same as above interval, except wet 42"-45"- Same as above interval, except very pale brown (10YR 7/4).	Collect Sample CBD-S02-SB04-2628- 13:55
30					End of Boring at 30' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 2 NRL-CBD-DP05

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/15/12 END : 10/15/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	48			0"-5" - Topsoil, dry 5"-24"- Poorly Graded Sand (SP) and Gravel, yellowish brown (10YR 5/8), dry, loose, sand medium to fine grained, gravel subrounded 24"-48"- Poorly Graded Sand, yellowish brown (10YR 5/8), moist, loose, sand medium to fine grained	Collect Sample CBD-S02-SS05-1012- 09:15
5	5-10	60			0"-12" - Same as above interval 12"-60"- Poorly Graded Sand (SP) with clay, brownish yellow (10YR 6/8), dry to moist, medium density, sand medium to fine grained, clay low to medium plasticity	
10	10-15	60			0"-28" - Same as above interval, mosit 28"-60"- Same as above interval, except light gray (10YR 7/1)	
15	15-20	45			0"-16" - Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, loose, sand medium to fine grained, few subrounded gravel 16"-36"- Same as above interval, except strong brown (7.5YR 5/8) 36"-45"- Same as interval above, except reddish yellow (7.5YR 6/8)	
20	20-25	40			0"-14" - Poorly Graded Sand (PG), strong brown (7.5YR 5/8), moist, very loose, sand medium to fine grained 14"-40"- Same as above interval, except brownish yellow (10YR 6/8)	
25	25-30	46			0"-40" - Same as above interval 40"- 46"- Same as above interval, except moist to wet	Collect Sample CBD-S02-SB05-2729- 09:25
30					End of Boring at 30' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 3 NRL-CBD-DP01

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/17/12 END : 10/17/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	49			0"-5" - Roadbase, dry 5"-20"- Poorly Graded Sand (SP) and Gravel, brown (7.5YR 4/4), moist, loose, sand medium to fine grained, subangular gravel 20"-49"- Clayey Sand (SC), strong brown (10YR 4/6), moist, firm, sand medium to fine grained, low plasticity clay, few gravel	Collect Sample CBD-S03-SS01-1012- 11:55
5	5-10	43			0"-5" - Poorly Graded Sand (SP), strong brown (7.5YR 5/6), moist, very loose, sand medium to fine grained, few subangular gravel 5"-26"- Same as above interval, except brownish yellow (10YR 6/6) 26"-43"- Same as above interval, except strong brown mottling (7.5YR 5/8)	
10	10-15	36			0"-36" - Same as above interval, except pale brown (2.5Y 8/3) with yellowish brown mottling (10YR 5/8)	Collect Sample CBD-S03-SB01-1315- 12:15 Collect Sample CBD-S03-SB01-1315-SD- 12:15 Collect Sample CBD-S03-SB01-1315-MS- 12:15 Collect S03-SB01P-1315- 12:20
15	15-20	55			0"-24" - Poorly Graded Sand with clay (SP-SC), pale brown (10YR 6/3), wet (visible water), soft, sand medium to fine grained, low plasticity clay 24"-55"- Clayey Sand (SC), light brownish gray (10YR 6/2), moist, soft, sand medium to fine grained, low plasticity clay	
20					End of Boring at 20' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 3 NRL-CBD-DP02

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/17/12 END : 10/17/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	32			0"-5" - Topsoil, dry 5"-18"- Poorly Graded Sand (SP), brownish yellow (10YR 6/6), dry, very loose, sand medium to fine grained 18"-25"- Same as above interval, except strong brown (7.5YR 5/8) 25"-32"- Same as above interval, exept very pale brown (10YR 8/3)	Collect Sample CBD-S03-SS02-1012- 11:20
5	5-10	39			0"-8" - Same as above interval, except yellowish brown (10YR 5/4), and moist 8"- 39" - Poorly Graded Sand (SP), very pale brown (2.5Y 8/3) with brownish yellow mottling (10YR 6/8), moist, very loose, soft, sand medium to fine grained	
10	10-15	45			0"-31" - Same as above interval 31"-45"- Clayey Sand (SC), light gray (2.5Y 7/2) with yellow mottling (10YR 7/8), moist, soft, sand medium to fine grained, low plasticity clay	
15	15-20	50			0"-36" - Same as above interval, except strong brown mottling (7.5YR 5/8) 36"-50"- Sandy Lean Clay (CL), pale brown (2.5Y 7/3) with yellowish brown mottling (10YR 5/8), moist, soft, sand medium to fine grained, low plasticity clay	
20	20-24	48			0"-32" - Same as above interval 32"-48"- Same as above interval, except pale brown (10YR 6/3) with yellowish brown mottling (10YR 5/8)	Collect Sample CBD-S03-SB02-2022- 11:30
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 3 NRL-CBD-DP03

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/17/12 END : 10/17/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	44			0"-6" - Topsoil, dry 6"-13"- Poorly Graded Sand with Gravel (SP), yellow (10YR 7/6), moist, very loose, sand medium to fine grained, subrounded gravel 13"-24"- Same as above interval, except yellowish brown (10YR 5/6) 24"-36"- Poorly Graded Sand (SP), yellow (10YR 7/6), moist, loose, sand medium to fine grained 36"-44"- Same as interval above, except brownish yellow (10YR 6/6)	Collect Sample CBD-S03-SS03-1012- 08:25
5	5-10	42			0"-5" - Same as above interval 5"- 24" - Poorly Graded Sand (SP), light gray (10YR 7/2) with yellow mottling (10YR 7/8), moist, very loose, soft, sand medium to fine grained 24"- 42"- Same as above interval except reddish yellow (7.5YR 7/8) and no mottling	
10	10-15	44			0"-36" - Same as above interval 36"-41"- Same as above interval, except reddish yellow (7.5YR 6/8) 41"- 44"- Same as above interval, except light gray (10YR 7/2) with reddish yellow mottling (7.5YR 6/8)	
15	15-20	52			0"-19" - Same as above interval, except moist to saturated 19"-52"- Sandy Lean Clay (CL), very pale brown (2.5Y 7/3) with brownish yellow mottling (10YR 6/8), moist, soft, sand medium to fine grained, low plasticity clay	
20	20-24	45			0"-30" - Same as above interval, except light gray (10YR 7/2) with yellowish red mottling (5YR 4/6) 30"-45"- Lean Clay (CL), dark gray (5Y 4/1), moist to dry, few medium to fine grainded sand, clay low to medium plasticity	Collect Sample CBD-S03-SSB03-2022- 08:40
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 3 NRL-CBD-DP04

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/17/12 END : 10/17/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	39			0"-5" - Topsoil, dry 5"-19"- Poorly Graded Sand (SP), yellowish brown (10YR 5/4), moist, very loose, sand medium to fine grained, little low plasticity clay 19"-39"- Poorly Graded Sand (SP), very pale brown (10YR 7/3), moist, verey loose, soft, sand medium to fine grained, few subrounded gravel	Collect Sample CBD-S03-SS04-1012- 10:10
5	5-10	39			0"-24" - Poorly Graded Sand (SP), brownish yellow (10YR 6/6), moist, very loose, soft, sand medium to fine grained, few low to medium plasticity clay 24"- 33"- Same as above interval except very pale brown (2.5Y 8/2) with yellow mottling (10YR 7/8) 33"-39"- Same as above interval, except brownish yellow (10YR 6/8) with no mottling	
10	10-15	52			0"-24" - Same as above interval except pale brown 2.5Y 7/3 with brownish yellow mottling (10YR 6/8), and few low plasticity clay, 24"-52"- Clayey Sand (SC), very pale brown (2.5Y 7/4) with brownish yellow mottling (10YR 6/8), moist, soft, sand medium to fine grained, clay low plasticity	
15	15-20	55			0"-18" - Same as above interval 18"-22"- Lean Clay with Sand (CL), light yellowish brown (2.5Y 6/4), moist, sand medium to fine grained, low plasticity clay 22"-55"- Lean Clay with Sand (CL), olive gray (5Y 5/2), moist, firm, sand very fine grained, clay low plasticity, silt	Collect Sample CBD-S03-SSB04-1820- 10:30
20	20-24	45			0"-12" - Same as above interval, except saturated (visible water) 12"-45"- Same as above interval, except moist	
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 3 NRL-CBD-DP05

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/17/12 END : 10/17/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	55			0"-9" - Topsoil, dry 9"-43"- Clayey Sand SC), yellowish brown (10YR 5/6), moist, firm, sand medium to fine grained, low plasticity clay 43"-55"- Poorly Graded Sand (SP), strong brown (7.5YR 5/8), moist, sand medium to fine grained, few low plasticity clay	Collect Sample CBD-S03-SS05-1012- 09:15
5	5-10	53			0"-35" - Clayey Sand SC), yellowish brown (10YR 5/8), moist, firm to soft, sand medium to fine grained, low plasticity clay 35"-43"- Poorly Graded Sand (SP), very pale brown (10YR 7/3) with brownish yellow mottling (10YR 6/8), moist, very loose, soft, sand medium to fine grained 43"- 46"- Same as above interval except reddish yellow (7.5YR 6/6) 46"-48"- Same as above interval 35"-43" 48"-53"- Same as interval 43"-46", except reddish yellow (7.5YR 6/8)	
10	10-15	37			0"-14" - Same as above interval 14"-26"- Poorly Graded Sand (SP), very pale brown (10YR 8/2) with brownish yellow mottling (10YR 6/8), moist, very loose, soft, sand medium to fine grained 26"-37"- Same as above interval	Collect Sample CBD-S03-SB05-1315- 09:40
15	15-20	52			0"-43" - Clayey Sand (SC), pale brown (2.5Y 7/3) with yellowish brown mottling (10YR 5/8), moist to wet, soft, sand medium to fine grained, low plasticity clay 43"-52"- Lean Clay with Sand (CL), brownish yellow (10YR 6/6) with brownish yellow mottling (10YR 6/8), moist, sand medium to fine grained, medium plasticity clay	
20	20-24	49			0"-9" - Clayey Sand (SC), light brownish gray (10YR 6/2) with yellowish brown mottling (10YR 5/8), moist, soft, sand medium to fine grained, low plasticity clay 9"-49"- Lean Clay with Sand (CL), gray (5Y 5/1), moist, firm to stiff, sand medium to fine grained, low pllasticity clay	
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 4 NRL-CBD-DP01

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/18/12 END : 10/18/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	54			0"-5" - Topsoil, dry 5"-35"- Clayey Sand SC), brownish yellow (10YR 6/8), dry, firm, sand medium to fine grained, low plasticity clay 35"-53"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, very loose, sand medium to fine grained, few low plasticity clay	Collect Sample CBD-S04-SS01-1012- 11:15 Collect Sample CBD-S04-SS01P-1012- 11:20
5	5-10	47			0"-28" - Same as above interval, except brownish yellow (10YR 6/6) 28"-39"- Same as above interval, except strong brown (7.5YR 5/8) 39"- 47"- Same as above interval except brownish yellow (10YR 6/8)	
10	10-15	44			0"-12" - Same as above interval 12"-34"- Same as above interval except very pale brown (10YR 8/2) with reddish yellow mottling (7.5YR 6/8) 34"-44"- Same as above interval except brownish yellow (10YR 6/6)	
15	15-20	30			0"-30" - Same as above interval except pale brown (2.5Y 7/4) with brownish yellow mottling (10YR 6/8)	Collect Sample CBD-S04-SB01-1820- 11:35
20	20-24	48			0"-28" - Same as above interval except wet at 20 feet (visible water) 28"- 48"- Clayey Sand (SC), dark gray (5Y 4/1), moist to wet, sand medium to fine grained, low plasticity clay	
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 4 NRL-CBD-DP02

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/18/12 END : 10/18/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	53			0"-6" - Topsoil, dry 6"-43"- Clayey Sand SC), strong brown (7.5YR 5/8) with yellow mottling (10YR 7/6), dry, firm, sand medium to fine grained, low plasticity clay 43"-53"- Poorly Graded Sand (SP), yellow (10YR 7/6), moist, very loose, sand medium to fine grained	Collect Sample CBD-S04-SS02-1012- 10:40
5	5-10	51			0"-7" - Same as above interval 7"-19"- Clayey Sand SC), reddish yellow (7.5YR 6/8) moist, soft, sand medium to fine grained, low plasticity clay 19"- 51"- Poorly Graded Sand (SP), reddish yellow (7.5YR 6/8), moist, very loose, sand medium to fine grained	
10	10-15	39			0"-4" - Same as above interval 4"-39" - Same as above interval, except yellow (10YR 7/6) with yellowish brown mottling (10YR 6/8).	
15	15-20	41			0"-33" - Same as above interval 33"-41" - Same as above interval except wet (visible water)	Collect Sample CBD-S04-SB02-1618- 11:00
20	20-24	14			0"-14" - Same as above interval (visible water)	
					End of Boring at 24' bgs	

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PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 4 NRL-CBD-DP03

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/18/12 END : 10/18/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	48			0"-5" - Topsoil, dry 5"-36"- Poorly Graded Sand and Gravel (SP), strong brown (7.5YR 5/6), moist, sand medium to fine grained, little low plasticity clay, gravel subrounded 36"- 48"- Clayey Sand withj Gravel (SC), reddish yellow (7.5YR 6/8), moist, firm, sand medium to fine grained, subrounded gravel, ow plasticity clay	Collect Sample CBD-S04-SS03-1012- 8:30
5	5-10	46			0"-19" - Poorly Graded Sand and Gravel (SP), strong brown (7.5YR 5/8), moist, very loose, sand medium to fine grained, little low plasticity clay, gravel subrounded 19"-46"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8) with very pale brown mottling (10YR 7/3), moist, soft, sand medium to fine grained, few low plasticity clay	
10	10-15	41			0"-24" - Same as above interval 24"-27"- Same as above interval, except reddish yellow (7.5YR 6/8) 27"- 41"- Same as interval 0"-24"	Collect Sample CBD-S04-SB03-1416- 8:40
15	15-20	20			0"-20" - Same as above interval, except wet at 1 foot	
20	20-24	48			0"-24" - Same as above interval 24"- 39"- Clayey Sand (SC), light brownish gray (10YR 6/2), moist, firm, soft, sand medium to fine grained, clay low plasticity 39"-48"- Sandy Lean Clay (CL), gray (5Y 5/1), moist, firm, sand medium to fine grained, clay medium plasticity	
					End of Boring at 24' bgs	

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PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 4 NRL-CBD-DP04

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/18/12 END : 10/18/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	30			0"-5" - Topsoil, dry 5"-14"- Clayey Sand (SC), yellowish brown (10YR 5/8), moist, sand medium to fine grained, subrounded gravel, clay medium plasticity 14"- 26"- Poorly Graded Sand and Gravel (SP), yellowsih brown (10YR 5/8), moist, loose, sand medium to fine grained, gravel subrounded. Waste debris observed, including glass shards, brick, and burned materials. Waste material is black (10YR 2/1) and shows staining. 26"- 30"- Poorly Graded Sand (SP), yellow (10YR 7/8), moist, soft, loose, sand medium to fine grained	Collect Sample CBD-S04-SS04-1012- 9:00 PID readings from 0-5 from 0.3 to 0.8ppm.
5	5-10	2			0"-2" - Poorly Graded Sand (SP) with debris materials, black (10YR 2/1), dry, debris material includes: glass shards, brick, burned debris, sand medium to fine grained	PID readings from 5-10 at 0.4 ppm
10	10-15	15			0"-15"- Poorly Graded Sand (SP), very pale brown (10YR 7.3) with yellowish red mottling (5YR 4/6), moist, soft, loose, sand medium to fine grained	Collect Sample CBD-S04-SB04-1012- 9:40
15	15-20	13			0"-13" - Same as above interval, except brownish yellow (10YR 6/8) with light gray mottling (10YR 7/2)	
20	20-24	48			0"-12" - Same as above interval 12"- 29"- Same as above interval, except moist to wet 29"-48"- Sandy Lean Clay (CL), gray (5Y 5/1), moist, firm, sand medium to fine grained, clay medium plasticity	
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 4 NRL-CBD-DP05

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/18/12 END : 10/18/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	60			0"-6" - Topsoil, dry 6"-60"- Clayey Sand (SC), strong brown (7.5YR 5/8), dry, firm, sand medium to fine grained, clay low plasticity	Collect Sample CBD-S04-SS05-1012- 11:50
5	5-10	47			0"-28" - Poorly Graded Sand (SP), brownish yellow (10YR 6/6), moist, very loose, soft, sand medium to fine grained 28"-47"- Same as above interval, except pale brown (2.5Y 7/4) with brownish yellow mottling (10YR 6/6)	
10	10-15	47			0"-47"- Same as above interval	Collect Sample CBD-S04-SB05-1315- 12:00
15	15-20	45			0"-45" - Same as above interval, except wet at 5" (visible water), and trace clay	
20	20-24	48			0"-28" - Same as above interval, wet 28"- 48"- Sandy Lean Clay (CL), dark gray (5Y 4/1), moist, firm to stiff, sand medium to fine grained, clay medium to low plasticity	
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 5 NRL-CBD-DP01

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/18/12 END : 10/18/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	45			0"-6" - Topsoil, dry 6"-45"- Clayey Sand (SC), brownish yellow (10YR 6/8) with strong brown mottling (7.5YR 5/8), dry, firm, sand medium to fine grained, clay low plasticity, few subrounded gravel	Collect Sample CBD-S05-SS01-1012- 15:30 Collect Sample CBD-S05-SS01P-1012- 15:35
5	5-10	54			0"-37" - Same as above interval, except brownish yellow (10YR 6/8) 37"-42"- Same as above interval, except strong brown (7.5YR 5/8) 42"- 54"- Same as above interval, except very pale brown (10YR 7/4) with yellowish brown mottlling (10YR 5/8)	
10	10-15	48			0"-20"- Poorly Graded Sand (SP), very pale brown (10YR 7/4) with yellowish brown mottling (10YR 5/8), moist, very loose, soft, sand medium to fine grained 20"-25"- Same as above interval, except brownish yellow (10YR 6/8) 25"- 36"- Same as above interval, except yellow (10YR 7/8) 36"-39"- Same as above interval, except dark red (2.5YR 3/6) 39"-48"- Same as above interval, except reddish yellow (7.5YR 6/8) with very pale brown mottling (10YR 8/2)	
15	15-20	48			0"-48" - Same as above interval	
20	20-24	25			0"-25" - Same as above interval	Collect Sample CBD-S05-SB01-2022-16:00 Collect Sample CBD-S05-SB01P-2022- 16:05
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 5 NRL-CBD-DP02

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/19/12 END : 10/19/12 LOGGER : Andrew Louder

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	27			0"-6" - Topsoil, dry 6"-27"- Sandy Clay (CL), yellowish brown (10YR 5/8), dry firm, sand medium to fine grained, clay no to low plasticity, few angular gravel	Collect Sample CBD-S05-SS02-1012- 10:15
5	5-10	51			0"-6" - Same as above interval 6"-51"- Poorly Graded Sand (SP), very pale brown (10YR 7/3), dry, loose, soft, some clay, no plasticity	
10	10-15	36			0"-26"- Poorly Graded Sand (SP), yellowish brown (10YR 5/8), dry, soft, very loose, sand medium to fine grained, trace angular gravel 26"-36"- Same as above interval, except reddish yellow (5YR 6/8)	
15	15-20	41			0"-9" - Same as above interval 9"-33"- Same as above interval, except brownsih yellow (10YR 6/8) with trace angular gravel 33"- 41"- Same as above interval, except very pale brown (10YR 7/3) and no gravel	
20	20-24	27			0"-14" - Same as above interval 14"-27"- Same as above interval, except wet	Collect Sample CBD-S05-SB02-2022-10:50
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 5 NRL-CBD-DP03

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/18/12 END : 10/18/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	42			0"-5" - Topsoil, dry 5"-28"- Clayey Sand (SC), yellowish brown (10YR 5/6) with very pale brown mottling (10YR 8/2), dry, firm, sand medium to fine grained, clay low plasticity 28"-42"- Poorly Graded Sand (SP), very pale brown (10YR 8/2) with yellowish brown mottling (10YR 5/6), moist, loose, sand medium to fine grained, some low plasticity clay	Collect Sample CBD-S05-SS03-1012- 14:50
5	5-10	20			0"-14" - Same as above interval 14"-20"- Poorly Graded Sand (SP) with waste material, black, (10YR 2/1), dry, very loose, sand medium to fine grained. Waste material includes: glass shards, burnt material, wood, and gravel.	Waste material encountered at 14"
10	10-15	16			0"-8"- Same as above interal, continued waste encountered 8"-16"- Sandy Lean Clay (CL), yellowish brown (10YR 6/6), moist, soft, sand medium to fine grained, clay medium plasticity	
15	15-20	33			0"-13" - Same as above interval 13"-15"- Waste layer, black (10YR 2/1), with a shiny sheen, odor present, waste includes glass, shards, loose 15"- 33"- Poorly Graded Sand (SP), strong brown (7.5YR 5/8), moist, loose	PID=41.1 ppm at waste interval 13"-15"
20	20-24	24			0"-24" - Same as above interval, except brownish yellow (10YR 6/6)	Collect Sample CBD-S05-SB03-1820-15:05
					End of Boring at 24' bgs	

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PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 5 NRL-CBD-DP04

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/19/12 END : 10/19/12 LOGGER : Andrew Louder

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	43			0"-5" - Topsoil, dry 5"-43"- Clayey Sand (SC), brownish yellow (10YR 6/6), dry, firm, sand medium to fine grained, clay low plasticity, few subrounded gravel	Collect Sample CBD-S05-SS04-1012- 9:10
5	5-10	56			0"-19" - Same as above interval 19"-56"- Sandy Clay (CL), light brownish gray (10YR 6/2), dry, sand medium to fine grained clay low plasticity	
10	10-15	43			0"-43"- Poorly Graded Sand (SP), light brownish gray (10YR 6/2) with mottling, dry, very loose, soft, sand medium to fine grained	
15	15-20	48			0"-19" - Same as above interval except reddish brown (5YR 4/4) 19"- 48"- Same as above, except yellow (10YR 7/8)	
20	20-24	33			0"-7" - Same as above interval 7"-33"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, very loose, very soft, sand medium to fine grained	Collect Sample CBD-S05-SB04-2022-9:40
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 5 NRL-CBD-DP05

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/19/12 END : 10/19/12 LOGGER : Andrew Louder

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	40			0"-40"- Clayey Sand (SC), yellowish brown (10YR 5/8), dry, firm, sand medium to fine grained, clay low plasticity, trace angular gravel	Collect Sample CBD-S05-SS05-1012- 11:15
5	5-10	37			0"-25" - Same as above interval 25"-37"- Same as above interval, except very pale gray (10YR 7/3)	
10	10-15	41			0"-5"- Same as above interval 5"-21"- Poorly Graded Sand (SP), yellowish brown (10YR 5/8), dry, soft, very loose, sand medium to fine grained, trace angular gravel 21"-41"- Same as above except very pale brown (10YR 7/4)	
15	15-20	36			0"-36"- Same as above interval except yellowish brown (10YR 5/6)	
20	20-24	48			0"-48" - Same as above interval, except becoming wet at 36"-48"	Collect Sample CBD-S05-SB05-2022-11:45
					End of Boring at 24' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 9 NRL-CBD-DP01

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/12/12 END : 10/12/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	44			0"-6" - Topsoil, dry 6"-36"- Poorly Graded Sand (SP), pale brown (2.5Y 7/3), dry, loose, soft, sand medium to fine grained, trace subrounded gravel 36"-44"- Clayey Sand (SC), pale brown (2.5Y 7/3), moist, soft, sand medium to fine grained, clay low-medium plasticity	Collect Sample CBD-S09-SS01-1012- 13:30 Collect Sample CBD-S09-SS01P-1012-13:40
5	5-10	53			0"-15" - Same as above interval 15"-48"- Sandy Fat Clay (CH), gray (2.5Y 7/2) with yellowish brown mottling (10YR 5/8), moist, firm, sand medium to fine grained, clay medium plasticity 48"-53"- Silt with Sand (SM), light yellowish brown (2.5Y 6/3), dry, loose, low-no plasticity	
10	10-15	52			0"-52" - Same as above interval, except dark gray (2.5Y 4/1) and dry	Collect Sample CBD-S09-SB01-1315- 14:10
15	15-20	53			0"-6" - Lean Clay (CL), dark gray (2.5Y 4/1), wet, firm, clay low-medium plasticity, trace sand 6"-53"- Lean Clay with Silt (CL), dark gray (2.5Y 4/1), dry, firm, dense, clay low-no plasticity	
20					End of Boring at 20' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 9 NRL-CBD-DP02

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/12/12 END : 10/12/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments Air Monitoring or other Observations
	0-5	32			0"-6" - Topsoil, dry 6"-26"- Clayey Sand (SC), brownish yellow (10YR 6/8), moist, loose, soft, sand medium to fine grained, clay low plasticity 26"-32"- Poorly Graded Sand (SP), very pale brown (10YR 7/4), moist, loose, soft, sand medium to fine grained, trace clay, few silt	Collect Sample CBD-S09-SS02-1012- 9:45
5	5-10	51			0"-24" - Clayey Sand (SC), brownish yellow (10YR 6/8), moist, loose, soft, sand medium to fine grained, clay low plasticity 24"-51"- Lean Clay with Sand (CL), yellow (10YR 7/6), moist, soft, sand medium to fine grained, clay medium plasticity, little silt	
10	10-15	55			0"-7" - Same as above interval 7"-55"- Lean Clay with Sand (CL), very pale brown (10 YR 8/3) with reddish yellow mottling (7.5YR 6/8), dry to moist, soft, sand fine, low plasticity, some silt	Collect Sample CBD-S09-SB02-1315- 9:55
15	15-20	56			0"-9" - Same as above interval, except wet 9"-22"- Lean Clay with Sand (CL), yellowish red (5YR 5/8), moist, soft to firm, clay low plasticity, some silt 22"-56"- Elastic Silt (MH), dark gray (2.5Y 4/1), dry, low plasticity, few sand	
20					End of Boring at 20' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 9 NRL-CBD-DP03

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/12/12 END : 10/12/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	37			0"-6" - Topsoil, dry 6"-14"- Well Graded Sand and Gravel (SW), brown (7.5YR 4/4), dry, very loose, sand medium to fine grained, subangular gravel 14"-37"- Poorly Graded Sand with Silt and Gravel (SP-SM), yellowish brown (10YR 5/6), dry, loose, sand medium to fine grained, gravel subrounded	Collect Sample CBD-S09-SS03-1012- 11:20
5	5-10	51			0"-13" - Same as above interval, except moist 13"-30"- Clayey Sand (SC), brownish yellow (10YR 6/8), moist, soft, sand medium to fine grained, clay low plasticity 30"-51"- Lean Clay with Sand (CL), light gray (10YR 7/2) with yellowish brown mottling (10YR 5/8), moist, firm to soft, sand fine grained, clay medium plasticity	
10	10-15	48			0"-21" - Same as above interval 21"- 26"- Same as above interval, except strong brown (7.5YR 5/8) 26"-41". Lean Clay with Sand (CL), light gray (10 YR 7/2), moist, firm, sand very fine grained, clay medium plasticity 41"-48"- Same as above, except strong brown (7.5YR 5/8).	Collect Sample CBD-S09-SB03-1315- 11:45 Collected Sample CBD-S09-SB03-1315-MS- 11:45 Collecte Sample CBD-S09-SB03-1315-SD- 11:45
15	15-20	48			0"-48"- Lean Clay (CL), dark gray (5Y 4/1), dry to moist, firm, clay low to medium plasticity	
20					End of Boring at 20' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 9 NRL-CBD-DP04

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/12/12 END : 10/12/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	32			0"-5" - Topsoil, dry 5"-14"- Gravel and Sand (GW) sub-base, white (5Y 8/1), dry, loose, sand medium to fine grained, subangular gravel 14"-32"- Poorly Graded Sand (SP), very pale brown (10YR 7/4), dry, very loose, sand medium to fine grained, trace clay	Collect Sample CBD-S09-SS04-1012- 8:00
5	5-10	50			0"- 50"- Lean Clay with Sand (CL), strong brown (7.5YR 5/6), moist, dense, sand medium to fine grained, clay low to medium plasticity	
10	10-15	52			0"- 52" - Fat Clay with Sand (CH), very pale brown (10 YR 8/3), moist, firm, sand medium to fine grained, clay medium plasticity	Collect Sample CBD-S09-SB04-1315- 8:40
15	15-20	53			0"-29"- Same as above interval, except wet 29"-53"- Lean Clay with Sand (CL), dark gray (5Y 4/1), moist, firm, sand medium to fine grained, clay medium plasticity	
20					End of Boring at 20' bgs	

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PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site AOC-C NRL-CBD-DP01

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/16/12 END : 10/16/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	49			0"-7" - Topsoil, dry 7"-49"- Clayey Sand (SC), yellowish brown (10YR 5/6), dry, dense, sand medium to fine grained, subrounded gravel	Collect Sample CBD-AOC-SS01-1012- 10:00 Collect Sample CBD-AOC-SS01P-1012- 10:10
5	5-10	52			0"- 52"- Lean Clay with Sand (CL), light gray (10YR 7/2) with strong brown mottling (7.5YR 5/8), dry, firm to stiff, sand medium to fine grained, clay low to medium plasticity	
10	10-15	55			0"- 36" - Same as abovei nterval 36"- 55"- Clayey Sand (SC), light gray (10YR 7/2) with reddish yellow mottling (7.5YR 6/8), moist, soft, sand medium to fine grained, clay low plasticity	
15	15-20	56			0"-56"- Same as above interval	
20	20-25	44			0"-12"- Poorly Graded Sand (SP), strong brown (7.5YR 5/8), moist, very loose, soft, sand medium to fine grained 12"-28"- Same as above interval, except yellow (10YR 7/8) 28"- 32"- Same as above interval, except yellowish red (5YR 4/6) 32"- 44"- Same as above interval, except yellow (2.5Y 7/6)	
25	25-30	36			0"-2"- Same as above interval, except yellowish red (5YR 4/6) 2"- 36"- Same as above interval, except brownish yellow (10YR 6/6)	Collect Sample CBD-AOC-SB01-2830- 10:50 Collect Sample CBD-AOC-SB01-2830-MS- 10:50 Collect Sample CBD-AOC-SB01-2830-SD- 10:50
30					End of Boring at 30' bgs	

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PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site AOC-C NRL-CBD-DP02

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/16/12 END : 10/16/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	56			0"-9" - Topsoil, dry 9"-32"- Clayey Sand (SC), yellowish brown (10YR 5/6), dry, loose, sand medium to fine grained, clay low plasticity 32"- 45"- Poorly Graded Sand and Gravel (SP), light yellowish brown (10YR 6/4), dry, very loose, sand medium to fine grained, subrounded gravel 45"-56"- Same as interval 9"-32", except brownish yellow (10YR 6/8)	Collect Sample CBD-AOC-SS02-1012- 8:40
5	5-10	52			0"- 52"- Lean Clay with Sand (CL), very pale brown (10YR 7/3) with yellowish brown mottling (10YR 5/8), dry, firm, sand medium to fine grained, clay low to medium plasticity	
10	10-15	53			0"- 53" - Same as above interval	
15	15-20	51			0"-36"- Clayey Sand (SC), yellowish brown (10YR 5/8) with very pale brown mottling (10YR 7/3), dry to moist, soft, sand medium to fine grained, clay low plasticity 36"-51"- Same as above interval, except light yellowish brown (2.5Y 6/4) with brownish yellow mottling (10YR 6/8), and moist	
20	20-25	43			0"-12"- Lean Clay with Sand (CL), light yellowish brown (2.5Y 6/4) with brownish yellow mottling (10YR 6/8), moist, soft, sand medium to fine grained, clay medium plasticity 12"-21"- Poorly Graded Sand and Gravel (SP), brownish yellow (10YR 6/8), moist, very loose, sand medium to fine grained, subrounded gravel 21"-43"- Poorly Graded Sand (SP), yellowish brown (10YR 6/8) with strong brown mottling (7.5YR 4/6) starting at 43", moist, loose, soft, sand medium to fine grained	
25	25-30	48			0"-16"- Same as above interval, except brownish yellow (10YR 6/6) 16"- 26"- Same as above interval, except brown (10YR 5/3) 26"- 39"- Same as above interval, except yellow (10YR 7/8) 39"- 48"- Same as above interval, except pale brown (2.5Y 7/4)	Collect Sample CBD-AOC-SB02-2830- 9:15
30					End of Boring at 30' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site AOC-C NRL-CBD-DP03

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/16/12 END : 10/16/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	49			0"-7" - Topsoil, dry 7"-20"- Clayey Sand (SC), brown (7.5YR 5/4), dry, loose, sand medium to fine grained, clay low plasticity 20"- 28"- Poorly Graded Sand (SP), brown (7.5YR 5/4), dry, loose, soft, sand medium to fine grained 28"-31"- Poorly Graded Sand and Gravel (SP), very pale brown (10YR 8/2), dry, very loose, sand medium to fine grained, subrounded gravel greater than 1" in diameter 31"-49"- Lean Clay with Sand (CL), brownish yellow (10YR 6/8), dry, sand medium to fine grained, clay low to medium plasticity	Collect Sample CBD-AOC-SS03-1012- 13:00
5	5-10	53			0"- 50"- Same as above interval, except very pale brown (10YR 8/4) with brownish yellow mottling (10YR 6/8) 50"- 52"- Same as above interval, except pink (7.5YR 7/4) 52"-53"- Gravelly Sand (SP), pink (7.5YR 7/4), dry, sand medium to fine grained, subangular gravel less than 1" in diameter	
10	10-15	51			0"- 13" - Poorly Graded Sand and Gravel (SP), very pale brown (10YR 8/2) with yellowish brown mottling (10YR 5/8), dry, very loose, sand medium to fine grained, subrounded gravel less than 1" in diameter 13"-43"- Clayey Sand (SC), very pale brown (10YR 7/3) with yellowish brown mottling (10YR 5/8), moist, stiff, sand medium to fine grained, clay low plasticity 43"- 41"- Poorly Graded Sand and Gravel (SP), brown (10YR 4/3) , dry, very loose, sand medium to fine grained, subrounded gravel	
15	15-20	52			0"-44"- Clayey Sand (SC), pale brown (2.5Y 7/3) with yellowish brown mottling (10YR 5/8), moist, firm, sand medium to fine grained, clay low to medium plasticity 44"-50"- Poorly Graded Sand and Gravel (SP), pale brown (2.5Y 8/3) , moist, very loose, sand medium to fine grained, subrounded gravel less than 1" in diameter 50"-52"- Poorly Graded Sand (SP), strong brown (7.5YR 5/8), moist, very loose, sand medium to fine grained	
20	20-25	49			0"-4"- Same as above interval 4"-18"- Same as above interval, except yellow (10YR 7/8) 18"-39"- Same as above interval, except strong brown (7.5YR 5/8) 39"-49"- Same as above interval, except brownish yellow (10YR 6/8)	
25	25-30	50			0"-9"- Poorly Graded Sand and Gravel (SP), brownish yellow (10YR 6/6) , moist, very loose, sand medium to fine grained, subrounded gravel less than 1" in diameter 9"- 50"- Poorly Graded Sand (SP), very pale brown (10YR 7/3), moist, loose, soft, sand medium to fine grained	Collect Sample CBD-AOC-SB03-2830- 13:30
30					End of Boring at 30' bgs	

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PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site AOC-C NRL-CBD-DP04

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/16/12 END : 10/16/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
	0-5	50			0"-7" - Topsoil, dry 7"-50"- Clayey Sand (SC), reddish yellow (7.5YR 6/6), dry, firm, sand medium to fine grained, clay low plasticity	Collect Sample CBD-AOC-SS04-1012- 13:55
5	5-10	53			0"- 12"- Lean Clay with Sand (CL), strong brown (7.5YR 5/8), moist, sand medium to fine grained, clay low to medium plasticity 12"- 53"- Same as above interval, except light yellowish brown (10YR 6/4) with brownish yellow mottling (10YR 6/8)	
10	10-15	50			0"- 37" - Clayey Sand (SC), very pale brown (10YR 7/4) with brownish yellow brown mottling (10YR 6/8), moist, firm, sand medium to fine grained, clay low plasticity 37"- 50"- Same as above interval, except pale brown (2.5Y 8/4)	
15	15-20	51			0"-30"- Same as above interval 30"-40"- Poorly Graded Sand (SP), white (10YR 8/1) with strong brown mottling (5/8), moist, very loose, soft, sand medium to fine grained, trace clay 40"-45"- Same as above interval, except strong brown (7.5YR 5/8) 45"-51"- Same as above interval, except reddish yellow (2.5Y 8/6)	
20	20-25	45			0"-6"- Same as above interval, except yellow (2.5Y 7/8) 6"-31"- Same as above interval, except reddish yellow (7.5YR 6/8) with dark red mottling (2.5YR 3/6) 31"-45"- Same as above interval, except brownish yellow (10YR 6/8)	
25	25-30	41			0"-41"- Poorly Graded Sand (SP), very pale brown (10YR 8/4), moist, very loose, soft, sand medium to fine grained, few low plasticity clay	Collect Sample CBD-AOC-SB04-2628- 14:55
30					End of Boring at 30' bgs	

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PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site AOC-C NRL-CBD-DP05

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/16/12 END : 10/16/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Comments: Air Monitoring or other Observations
5	0-5	52			0"-7" - Topsoil, dry 7"-26"- Clayey Sand (SC), strong brown (7.5YR 5/6), dry, very loose, sand medium to fine grained, clay low plasticity 26"- 37"- Poorly Graded Sand and Gravel (SP), strong brown (7.5YR 5/6), dry, very loose, sand medium to fine grained, subrounded gravel 37"-48"- Same as above, except pale brown (10YR 7/4) 48"-52"- Same as interval 7"-26", except yellowish brown (10YR 5/8)	Collect Sample CBD-AOC-SS05-1012- 15:30
10	5-10	56			0"- 41"- Lean Clay with Sand (CL), yellow (10YR 7/6) with reddish yellow mottling (7.5YR 6/8), dry, sand medium to fine grained, clay low to medium plasticity, trace subrounded gravel 41"- 56"- Clayey Sand (SC), brownish yellow (10YR 6/8), moist, soft, sand medium to fine grained, clay low plasticity	
15	10-15	55			0"- 55" - Same as above interval, except very pale brown (2.5Y 8/4) with reddish yellow mottling (7.5YR 6/8)	
20	15-20	52			0"-6"- Poorly Graded Sand (SP), very pale brown (10YR 8/2), moist, loose, soft, sand medium to fine grained 6"-52"- Clayey Sand (SC), very pale brown (2.5Y 8.4) with reddish yellow mottling (7.5YR 7/8), moist, dense, soft, sand medium to fine grained, clay low plasticity	
25	20-25	40			0"-17"- Poorly Graded Sand (SP), yellow (10YR 7/6) with strong brown mottling (7.5YR 5/8), moist, very loose, soft, sand medium to fine grained 17"-22"- Same as above interval, except very pale brown (10Y 8/2) with strong brown mottling (7.5YR 5/8) 22"-40"- Same as interval 0"-17"	
30	25-30	48			0"-13"- Poorly Graded Sand (SP), brownish yellow (10YR 6/6) with yellowish red mottling (5Y 5/8), moist, loose, sand medium to fine grained, few subrounded gravel 13"-21"- Same as above interval, except very pale brown (2.5Y 7/4) 21"- 33"- Same as above interval, except with reddish yellow mottling (7.5YR 6/8) 33"-48"- Poorly Graded Sand (SP), very pale brown (10YR 8/2), moist, very loose, soft, sand medium to fine grained	Collect Sample CBD-AOC-SB05-2729- 16:00
					End of Boring at 30' bgs	

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PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 7 NRL-CBD-T1-1

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
	0-5	30			0"-6" - Topsoil, dry 6"-30"- Clayey Sand (SC), yellowish brown (10YR 5/6), dry, loose, soft, sand medium to fine grained, clay low plasticity, trace subangular gravel	
5	5-8	36			0"- 19"- Lean Clay (CL), light gray (7.5YR 7/1) with reddish yellow mottling (7.5YR 6/8), moist, clay medium plasticity 19"- 36"- Same as above interval, except light grayish olive (10YR 6/2) with mottling of black (5Y 2.5/1) and light olive brown (2.5Y 5/6)	
					End of Boring at 8' bgs	

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PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T1-2

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	53			0"-6" - Topsoil, dry 6"-53"- Clayey Sand (SC), yellowish brown (10YR 5/6), moist, medium density, sand medium to fine grained, clay low plasticity, trace subangular gravel less than 1" in diameter	
	5-8	12			0"- 12"- Lean Clay (CL), greenish gray (GLEY 1 5/1), moist, soft, clay medium plasticity	
					End of Boring at 8' bgs	

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PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T1-3

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	45			0"-5" - Topsoil, dry 5"-39"- Clayey Sand with gravel (SC), light olive brown (2.5Y 5/3), dry, loose, sand medium to fine grained, clay low plasticity, subangular gravel less than 1" in diameter 39"- 45"- Same as above interval, except light brownish gray (2.5Y 6/2) and moist	
	5-8	36			0"- 36"- Lean Clay with Sand (CL), light grayish olive (10Y 6/2) with mottling black (5Y 2.5/1) and light olive brown (2.5Y 5/6), moist, soft, sand medium to fine grained, clay medium plasticity	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 7 NRL-CBD-T1-4

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	45			0"-5" - Topsoil, moist 5"-21"- Clayey Sand (SC), yellowish brown (10YR 5/6), dry to moist, loose, sand medium to fine grained, clay low plasticity, few subangular gravel 21"- 45"- Same as above interval, except light olive brown (2.5Y 5/4)	
	5-8	36			0"- 36"- Lean Clay with Sand (CL), light grayish olive (10Y 6/2) with mottling black (5Y 2.5/1), moist, soft, sand medium to fine grained, clay medium plasticity, petroleum like odor present	PID= 10ppm. Petroleum like odor present
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T1-5

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	48			0"-6" - Topsoil, moist 6"-24"- Clayey Sand (SC), yellowish brown (10YR 5/6), moist, loose, soft, sand medium to fine grained, clay low plasticity 24"- 36"- Same as above interval, except with subangular gravel less than 1" in diameter 36"-48"- Clayey Sand (SC), brown (10YR 5/3), moist, soft, loose, sand medium to fine grained, clay low plasticity	Collect CBD-S07-SS01-1012- 14:40 Collect CBD-S07-SS01-1012-MS- 14:40 Collect CBD-S07-SS01-1012-SD- 14:40 Collect CBD-S07-SS01P-1012- 14:45
	5-8	27			0"- 12"- Same as above interval, except blue plastic visible at 12" 12"-14"- Lean Clay with Sand (CL), black (10Y 2/1), moist, soft, sand medium to fine grained, clay medium plasticity, petroleum like odor present 14"-27"- Same as above interval, except light grayish olive (10Y 6/2) with light greenish gray mottling (10Y 5GY)	PID= 15ppm. Petroleum like odor present Collect CBD-S07-SB01-0608- 14:50 Collect CBD-S07-SB01-0608-MS 14:50 Collect CBD-S07-SB01-0608-SD 14:50 Collect CBD-S07-SB01P-0608 14:55
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T1-6

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	36			0"-5" - Topsoil, moist 5"-12"- Poorly Graded Sand (SP), yellowish brown (10YR 5/8), moist, soft, sand medium to fine grained, trace clay 12"- 18"- Gravel with Poorly Graded Sand (GW), light gray (10YR 7/1), dry, very loose, sand medium to fine grained, subrounded gravel less than 1" in diameter 18"- 33"- Poorly Graded Sand (SP), brown (10YR 4/3), moist, loose, sand medium to fine grained, little low plasticity clay 33"-36"- Same as above interval, except gray (10YR 6/1)	Collect CBD-S07-SS02-1012- 15:00
	5-8	30			0"- 12"- Clayey Sand (SC), gray (10YR 6/1), moist, soft, sand medium to fine grained, clay low plasticity 12"-30"- Lean Clay with Sand (CL), light grayish olive (10Y 6/2) with reddish yellow mottling (7.5YR 6/8), moist, soft, sand medium to fine grained, clay medium plasticity	PID= 10ppm. Collect CBD-S07-SB02-0507- 15:05
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T1-7

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	40			0"-6" - Topsoil with gravel, moist 6"-25"- Clayey Sand (SC), yellowish brown (10YR 5/6), moist, soft, sand medium to fine grained, low plasticity clay 25"- 32"- Same as above interval, except grayish brown (10YR 5/2) 32"-40"- Same as above interval, except grayish brown (2.5Y 5/2)	
	5-8	12			0"-12"- Lean Clay with Sand (CL), light grayish olive (10Y 6/2) with mottling black (5Y 2.5/1) and light olive brown (2.5Y 5/6), moist, soft, sand medium to fine grained, clay medium plasticity	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 7 NRL-CBD-T1-8

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	52			0"-5" - Topsoil, moist 5"-36"- Poorly Graded Sand (SP), brown (10YR 5/3), moist, soft, sand medium to fine grained, some low plasticity clay 36"- 52"- Sandy Lean Clay (CL), dark gray (10YR 4/1), moist, soft, sand medium to fine grained, clay low plasticity	Collect CBD-S07-SS03-1012- 15:10
	5-8	24			0"- 24"- Same as above interval, except light grayish olive (10Y 6/2) with olive mottling (5Y 5/6), strong petroleum-like odor present from 5"-24"	PID= 73.1 ppm. Strong petroluem-like odor present Collect CBD-S07-SB03-0608- 15:15
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T1-9

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	40			0"-5" - Topsoil, moist 5"-40"- Clayey Sand (SC), strong brown (7.5YR 4/6), moist, soft, sand medium to fine grained, clay low plasticity	
	5-8	40			0"- 4"- Sandy Lean Clay (CL), strong brown (7.5YR 4/6), moist, firm to soft, sand medium to fine grained, clay medium plasticity 4"- 40"- Same as above interval except light grayish olive (10Y 6/2) with mottling olive (5Y 5/6) and black (5Y 2.5/1), staining observed	Staining observed from 4"-40"
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T2-1

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	39			0"-5" - Topsoil, moist 5"-24"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, vey loose, sand medium to fine grained, little subrounded gravel less than 1" in diameter 24"- 39"- Same as above interval, except yellow (10YR 7/8)	
	5-8	31			0"- 31"- Same as above interval	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T2-2

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	39			0"-6" - Topsoil, moist 6"-19"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, vey loose, sand medium to fine grained, little subrounded gravel less than 1" in diameter 19"- 39"- Same as above interval, except yellow (10YR 7/8)	
	5-8	32			0"- 32"- Same as above interval except yellow (10YR 7/6)	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T2-3

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	39			0"-6" - Topsoil, moist 6"-19"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, vey loose, sand medium to fine grained, little subrounded gravel less than 1" in diameter 19"- 39"- Same as above interval, except yellow (10YR 7/8)	
	5-8	32			0"- 32"- Same as above interval except yellow (10YR 7/6)	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T2-4

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	39			0"-6" - Topsoil, moist 6"-28"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, vey loose, soft, sand medium to fine grained, trace subrounded gravel less than 1" in diameter 28"- 39"- Same as above interval, except yellow (10YR 7/8)	Collect CBD-S07-SS04-1012- 11:35
	5-8	31			0"- 31"- Same as above interval, except trace subrounded gravel	Collect CBD-S07-SB04-0608- 11:40
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T2-5

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	33			0"-6" - Topsoil, moist 6"-28"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, vey loose, soft, sand medium to fine grained, trace subrounded gravel less than 1" in diameter 28"- 33"- Same as above interval, except yellow (10YR 7/8)	Collect CBD-S07-SS05-1012- 11:45
	5-8	30			0"- 30"- Same as above interval, except some subrounded gravel	Collect CBD-S07-SB05-0608- 11:50
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 7 NRL-CBD-T2-6

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	39			0"-6" - Topsoil, moist 6"-33"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, vey loose, soft, sand medium to fine grained, few subrounded gravel less than 1" in diameter 33"- 39"- Same as above interval, except yellow (10YR 7/8)	Collect CBD-S07-SS06-1012- 11:55
	5-8	32			0"- 32"- Same as above interval	Collect CBD-S07-SB06-0608- 12:00
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T2-7

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	42			0"-5" - Topsoil, moist 5"-24"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, vey loose, soft, sand medium to fine grained, trace subrounded gravel less than 1" in diameter 24"- 42"- Same as above interval, except yellow (10YR 7/8)	
	5-8	24			0"- 24"- Same as above interval	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 7 NRL-CBD-T2-8

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	38			0"-6" - Topsoil, moist 6"-20"- Poorly Graded Sand (SP), brownish yellow (10YR 6/8), moist, vey loose, soft, sand medium to fine grained, few subrounded gravel less than 1" in diameter 20"- 38"- Same as above interval, except yellow (10YR 7/8), and little subrounded gravel	
	5-8	27			0"- 27"- Same as above interval	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T2-9

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	45			0"-5" - Topsoil, moist 5"-15"- Poorly Graded Sand (SP), yellowish brown (10YR 5/8), moist, vey loose, soft, sand medium to fine grained, few subrounded gravel 15"- 45"- Same as above interval, except yellow (10YR 7/8), and no gravel present	
	5-8	30			0"- 30"- Same as above interval, except brownish yellow (10YR 6/8)	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T3-1

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	42			0"-5" - Topsoil, moist 5"-16"- Poorly Graded Sand (SP), brown (7.5YR 4/4), moist, loose, sand medium to fine grained, few subrounded gravel 16"- 20"- Same as above interval, except pale brown (7.5YR 7/4) 20"- 42"- Same as above interval, except brown (7.5YR 4/4)	
	5-8	34			0"- 21"- Same as above interval 21"- 34"- Lean Clay with Sand (CL), yellowish brown (10YR 5/6), moist, soft, sand medium to fine grained, clay medium plasticity	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T3-2

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	33			0"-6" - Topsoil, moist 6"-20"- Poorly Graded Sand with Gravel (SP), yellowish brown (10YR 5/6), moist, loose, soft, sand medium to fine grained, gravel subrounded 20"- 33"- Same as above interval, except dark yellowish brown (10YR 4/4), and no gravel present	
	5-8	29			0"- 13"- Same as above interval 13"- 29"- Lean Clay with Sand (CL), dark yellowish brown (10YR 5/8), moist, soft to firm, sand medium to fine grained, clay medium plasticity	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T3-3

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	37			0"-6" - Topsoil, moist 6"-21"- Poorly Graded Sand with Gravel (SP), yellow (10YR 7/6), moist, loose, soft, sand medium to fine grained, gravel subrounded 21"- 37"- Same as above interval, except dark yellowish brown (10YR 3/4), and no gravel present	
	5-8	27			0"- 12"- Same as above interval, except yellowish brown (10YR 5/4) at 6"-12" 12"- 27"- Lean Clay with Sand (CL), yellowish brown (10YR 5/6), moist, soft to firm, sand medium to fine grained, clay medium plasticity	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T3-4

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	36			0"-6" - Topsoil, moist 6"-20"- Poorly Graded Sand with Gravel (SP), yellowish brown (10YR 5/6), moist, loose, soft, sand medium to fine grained, gravel subrounded 20"- 36"- Same as above interval, except yellowish brown (10YR 5/4), and no gravel present	Collect CBD-S07-SS07-1012- 09:30
	5-8	36			0"- 25"- Lean Clay with Sand (CL), yellowish brown (10YR 5/8), moist, soft to firm, sand medium to fine grained, clay medium plasticity 25"- 36"- Same as above interval, except yellow (10YR 7/6)	Collect CBD-S07-SB07-0608- 09:35
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T3-5

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	48			0"-6" - Topsoil, moist 6"-24"- Poorly Graded Sand (SP), dark yellowish brown (10YR 4/4), moist, loose, soft, sand medium to fine grained 24"- 31"- Same as above interval, except brown (10YR 4/3) 31"- 48"- Same as above interval, except yellowish brown (10YR 5/8)	Collect CBD-S07-SS08-1012- 09:40
	5-8	27			0"- 18"- Lean Clay with Sand (CL), yellowish brown (10YR 6/6), moist, soft to firm, sand medium to fine grained, clay medium plasticity 18"- 27"- Same as above interval, except brownish yellow (10YR 6/6)	Collect CBD-S07-SB08-0608- 09:45
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 7 NRL-CBD-T3-6

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	44			0"-6" - Topsoil, moist 6"-16"- Poorly Graded Sand (SP), yellow (10YR 7/6), moist, loose, soft, sand medium to fine grained 16"- 28"- Same as above interval, except yellowish brown (10YR 5/6) 28"- 37"- Same as above interval, except dark brown (10YR 3/3) 37"-44"- Same as above interval, except brownish yellow (10YR 6/6)	Collect CBD-S07-SS09-1012- 09:50
	5-8	36			0"- 36"- Lean Clay with Sand (CL), yellowish brown (10YR 5/6), moist, soft to firm, sand medium to fine grained, clay medium plasticity	Collect CBD-S07-SB09-0608- 09:55
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER 423675.FI.MS

BORING NUMBER Site 7 NRL-CBD-T3-7

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	48			0"-6" - Topsoil, moist 6"-31"- Poorly Graded Sand (SP), dark yellowish brown (10YR 4/6), moist, loose, soft, sand medium to fine grained 31"- 48"- Same as above interval, except yellowish brown (10YR 5/8), and few low plasticity clay	
	5-8	30			0"- 24"- Lean Clay with Sand (CL), yellowish brown (10YR 5/8), moist, soft to firm, sand medium to fine grained, clay medium plasticity 24"-30"- Same as above interval, except with dark yellowish brown mottling (10YR 3/6)	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T3-8

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	38			0"-6" - Topsoil, moist 6"-24"- Poorly Graded Sand (SP), dark yellowish brown (10YR 4/6), moist, loose, soft, sand medium to fine grained 24"- 38"- Same as above interval, except brownish yellow (10YR 6/6), and few low plasticity clay	
	5-8	18			0"- 18- Lean Clay with Sand (CL), brownish yellow (10YR 6/8), moist, soft to firm, sand medium to fine grained, clay medium plasticity	
					End of Boring at 8' bgs	

CH2MHILL

PROJECT NUMBER	BORING NUMBER
423675.FI.MS	Site 7 NRL-CBD-T3-9

SOIL BORING LOG

PROJECT : NRL-CBD Base Wide Site Investigation Fieldwork, Chesapeake Beach, MD

DRILLING CONTRACTOR : Ground Zero

DRILLING METHOD AND EQUIPMENT USED Geoprobe

WATER LEVELS : START : 10/22/12 END : 10/22/12 LOGGER : Emily Curbo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE		SAMPLE DESCRIPTION	Comments
					SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	Air Monitoring or other Observations
5	0-5	45			0"-6" - Topsoil, moist 6"-25"- Poorly Graded Sand (SP), dark yellowish brown (10YR 4/6), moist, loose, soft, sand medium to fine grained 25"- 37"- Same as above interval, except brownish yellow (10YR 6/8) 37"-45"- Lean Clay with Sand (CL), strong brown (7.5YR 5/8), moist, soft, sand medium to fine grained, clay medium plasticity	
	5-8	27			0"- 27- Same as above interval, except reddish yellow (7.5YR 6/8)	
					End of Boring at 8' bgs	

Appendix D
Raw Analytical Data

TABLE D.1-1

Site 2 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S02-DP01			CBD-S02-DP02		CBD-S02-DP03		CBD-S02-DP04		CBD-S02-DP05	
Sample ID	CBD-S02-SS01-1012	CBD-S02-SB01-2628	CBD-S02-SB01P-2628	CBD-S02-SS02-1012	CBD-S02-SB02-2426	CBD-S02-SS03-1012	CBD-S02-SB03-2830	CBD-S02-SS04-1012	CBD-S02-SB04-2628	CBD-S02-SS05-1012	CBD-S02-SB05-2729
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	26 - 28	26 - 28	0 - 0.5	24 - 26	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 0.5	27 - 29
Chemical Name											
Volatile Organic Compounds (UG/KG)											
1,1,1-Trichloroethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,1,2,2-Tetrachloroethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,1,2-Trichloroethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,1-Dichloroethane	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
1,1-Dichloroethene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,2,3-Trichlorobenzene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,2,4-Trichlorobenzene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,2-Dibromo-3-chloropropane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,2-Dibromoethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,2-Dichlorobenzene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,2-Dichloroethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,2-Dichloropropane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
1,3-Dichlorobenzene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
1,4-Dichlorobenzene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
2-Butanone	2.8 J	2.3 J	1.3 J	4.6 J	3.6 J	16	0.64 UJ	3.8 J	0.53 U	4.2 J	0.6 U
2-Hexanone	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	7 J	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
4-Methyl-2-pentanone	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Acetone	40 B	6.6 B	4.9 U	120	18	350 J	26 J	86 B	5.3 U	160	6 U
Benzene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Bromochloromethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Bromodichloromethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Bromoform	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Bromomethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Carbon disulfide	0.68 B	0.51 B	0.34 B	0.24 B	0.61 B	0.3 B	0.64 UJ	0.34 B	0.19 B	0.27 B	0.22 B
Carbon tetrachloride	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Chlorobenzene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Chloroethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Chloroform	0.21 B	0.19 B	0.2 B	0.25 B	0.29 B	0.29 U	0.32 UJ	0.22 B	0.26 B	0.25 B	0.25 B
Chloromethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
cis-1,2-Dichloroethene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
cis-1,3-Dichloropropene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Cyclohexane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Dibromochloromethane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Dichlorodifluoromethane (Freon-12)	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Ethylbenzene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Isopropylbenzene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
m- and p-Xylene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Methyl acetate	0.99 B	1 B	0.78 B	1.5 B	1.6 B	790 J	2.6 B	1.1 B	1.3 B	1.4 B	1.7 B
Methylcyclohexane	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Methylene chloride	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	9 B	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Methyl-tert-butyl ether (MTBE)	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
o-Xylene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U

TABLE D.1-1

Site 2 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S02-DP01			CBD-S02-DP02		CBD-S02-DP03		CBD-S02-DP04		CBD-S02-DP05	
Sample ID	CBD-S02-SS01-1012	CBD-S02-SB01-2628	CBD-S02-SB01P-2628	CBD-S02-SS02-1012	CBD-S02-SB02-2426	CBD-S02-SS03-1012	CBD-S02-SB03-2830	CBD-S02-SS04-1012	CBD-S02-SB04-2628	CBD-S02-SS05-1012	CBD-S02-SB05-2729
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	26 - 28	26 - 28	0 - 0.5	24 - 26	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 0.5	27 - 29
Styrene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	1.7	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Tetrachloroethene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Toluene	0.21 J	0.22 J	0.49 U	5.1	0.29 B	2.8 B	0.64 UJ	0.52 J	0.53 U	0.4 B	0.6 U
trans-1,2-Dichloroethene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
trans-1,3-Dichloropropene	0.47 U	0.48 U	0.49 U	0.54 U	0.54 U	0.57 U	0.64 UJ	0.54 U	0.53 U	0.51 U	0.6 U
Trichloroethene	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Trichlorofluoromethane (Freon-11)	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Vinyl chloride	0.24 U	0.24 U	0.24 U	0.27 U	0.27 U	0.29 U	0.32 UJ	0.27 U	0.26 U	0.25 U	0.3 U
Semivolatile Organic Compounds (UG/KG)											
1,1-Biphenyl	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
1,2,4,5-Tetrachlorobenzene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
2,2'-Oxybis(1-chloropropane)	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
2,3,4,6-Tetrachlorophenol	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
2,4,5-Trichlorophenol	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
2,4,6-Trichlorophenol	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
2,4-Dichlorophenol	3.7 U	3.8 U	3.6 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.6 U	4 U
2,4-Dimethylphenol	37 U	38 U	37 U	36 U	36 U	38 U	40 U	36 U	38 U	37 U	40 U
2,4-Dinitrophenol	190 U	190 U	180 U	180 U	180 U	190 U	200 U	180 U	190 U	180 U	200 U
2,4-Dinitrotoluene	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
2,6-Dinitrotoluene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
2-Chloronaphthalene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
2-Chlorophenol	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
2-Methylnaphthalene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
2-Methylphenol	7.3 U	7.5 U	7.2 U	7.2 U	7.1 U	7.5 U	8 U	7.1 U	7.5 U	7.2 U	8 U
2-Nitroaniline	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
2-Nitrophenol	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
3,3'-Dichlorobenzidine	370 U	380 U	370 U	360 U	360 U	380 U	400 U	360 U	380 U	370 U	400 U
3-Nitroaniline	37 U	38 U	37 U	36 U	36 U	38 U	40 U	36 U	38 U	37 U	40 U
4,6-Dinitro-2-methylphenol	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
4-Bromophenyl-phenylether	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
4-Chloro-3-methylphenol	7.3 U	7.5 U	7.2 U	7.2 U	7.1 U	7.5 U	8 U	7.1 U	7.5 U	7.2 U	8 U
4-Chloroaniline	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
4-Chlorophenyl-phenylether	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
4-Methylphenol	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
4-Nitroaniline	37 U	38 U	37 U	36 U	36 U	38 U	40 U	36 U	38 U	37 U	40 U
4-Nitrophenol	37 U	38 U	37 U	36 U	36 U	38 U	40 U	36 U	38 U	37 U	40 U
Acenaphthene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.1 K	2 U
Acenaphthylene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Acetophenone	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
Anthracene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.1 K	2 U
Atrazine	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
Benzaldehyde	19 UL	19 UL	18 UL	18 UL	18 UL	14 L	20 UL	18 UL	19 UL	25 L	20 UL
Benzo(a)anthracene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	2.1 J	1.9 U	6.6 K	2 U
Benzo(a)pyrene	0.74 U	0.76 U	0.73 U	0.73 U	0.73 U	0.77 U	0.81 U	1.1 J	0.76 U	6.7	0.81 U
Benzo(b)fluoranthene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	2.5 J	3.8 U	9.6 K	4 U

TABLE D.1-1

Site 2 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S02-DP01			CBD-S02-DP02		CBD-S02-DP03		CBD-S02-DP04		CBD-S02-DP05	
Sample ID	CBD-S02-SS01-1012	CBD-S02-SB01-2628	CBD-S02-SB01P-2628	CBD-S02-SS02-1012	CBD-S02-SB02-2426	CBD-S02-SS03-1012	CBD-S02-SB03-2830	CBD-S02-SS04-1012	CBD-S02-SB04-2628	CBD-S02-SS05-1012	CBD-S02-SB05-2729
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	26 - 28	26 - 28	0 - 0.5	24 - 26	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 0.5	27 - 29
Benzo(g,h,i)perylene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.4 J	1.9 U	2.9 K	2 U
Benzo(k)fluoranthene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	5.9 K	4 U
bis(2-Chloroethoxy)methane	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
bis(2-Chloroethyl)ether	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
bis(2-Ethylhexyl)phthalate	6.7 B	5.3 B	24 B	7 B	17 B	5.9 B	20 U	5.7 B	5.8 B	8.8 B	6.2 B
Butylbenzylphthalate	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	22 J	3.8 U	110 K	4 U
Caprolactam	19 U	19 U	18 U	18 U	18 U	19 U	20 U	18 U	19 U	18 U	20 U
Carbazole	37 U	38 U	37 U	36 U	36 U	38 U	40 U	36 U	38 U	37 U	40 U
Chrysene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 J	1.9 U	7 K	2 U
Dibenz(a,h)anthracene	0.74 U	0.76 U	0.73 U	0.73 U	0.73 U	0.77 U	0.81 U	0.72 U	0.76 U	1.5 U	0.81 U
Dibenzofuran	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Diethylphthalate	8.6 B	8.7 B	8.6 B	15 B	13 B	23 B	9.8 B	13 B	13 B	24 B	11 B
Dimethyl phthalate	3.7 U	3.8 U	3.7 U	2.6 J	2.1 J	3.8 U	4 U	2.5 J	3.8 U	3.7 U	4 U
Di-n-butylphthalate	19 U	19 U	18 U	18 U	18 U	17 B	20 U	18 U	19 U	110 B	20 U
Di-n-octylphthalate	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Fluoranthene	1.1 J	1.9 U	1.8 U	1.1 J	1.8 U	1.9 U	2 U	4.6 J	1.9 U	9.9 K	2 U
Fluorene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.1 K	2 U
Hexachlorobenzene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Hexachlorobutadiene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Hexachlorocyclopentadiene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
Hexachloroethane	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Indeno(1,2,3-cd)pyrene	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 K	4 U
Isophorone	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Naphthalene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
n-Nitroso-di-n-propylamine	3.7 U	3.8 U	3.7 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.7 U	4 U
n-Nitrosodiphenylamine	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Nitrobenzene	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	2 U	1.8 U	1.9 U	1.8 U	2 U
Pentachlorophenol	37 U	38 U	37 U	36 U	36 U	38 U	40 U	36 U	38 U	37 U	40 U
Phenanthrene	1.1 J	1.9 U	1.8 U	1.1 J	1.8 U	1.2 J	2 U	1.8 J	1.9 U	5.5 K	2 U
Phenol	3.7 U	3.8 U	3.6 U	3.6 U	3.6 U	3.8 U	4 U	3.6 U	3.8 U	3.6 U	4 U
Pyrene	3.7 U	3.8 U	3.6 U	3.6 U	3.6 U	3.8 U	4 U	3.9 J	3.8 U	11 K	4 U
Pesticide/Polychlorinated Biphenyls (UG/KG)											
Aroclor-1016	14 U	15 U	14 U	14 U	14 U	15 U	16 U	14 U	15 U	14 U	16 U
Aroclor-1221	14 U	15 U	14 U	14 U	14 U	15 U	16 U	14 U	15 U	14 U	16 U
Aroclor-1232	14 U	15 U	14 U	14 U	14 U	15 U	16 U	14 U	15 U	14 U	16 U
Aroclor-1242	14 U	15 U	14 U	14 U	14 U	15 U	16 U	14 U	15 U	14 U	16 U
Aroclor-1248	14 U	15 U	14 U	14 U	14 U	15 U	16 U	14 U	15 U	14 U	16 U
Aroclor-1254	14 U	15 U	14 U	14 U	14 U	15 U	16 U	14 U	15 U	14 U	16 U
Aroclor-1260	14 U	15 U	14 U	14 U	14 U	3.6 J	16 U	14 U	15 U	5.1 J	16 U
Aroclor-1262	14 U	15 U	14 U	14 U	14 U	15 U	16 U	14 U	15 U	14 U	16 U
Aroclor-1268	14 U	15 U	14 U	14 U	14 U	15 U	16 U	14 U	15 U	14 U	16 U
Total Metals (MG/KG)											
Aluminum	8,800	2,700	2,300	7,600	2,000	12,000	2,000	10,000	2,100	7,300	2,600
Antimony	0.19	0.12	0.22	0.2	0.23	0.25	0.11	0.21	0.17	0.19	0.18

TABLE D.1-1

Site 2 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S02-DP01			CBD-S02-DP02		CBD-S02-DP03		CBD-S02-DP04		CBD-S02-DP05	
Sample ID	CBD-S02-SS01-1012	CBD-S02-SB01-2628	CBD-S02-SB01P-2628	CBD-S02-SS02-1012	CBD-S02-SB02-2426	CBD-S02-SS03-1012	CBD-S02-SB03-2830	CBD-S02-SS04-1012	CBD-S02-SB04-2628	CBD-S02-SS05-1012	CBD-S02-SB05-2729
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	26 - 28	26 - 28	0 - 0.5	24 - 26	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 0.5	27 - 29
Arsenic	3.3 L	1.8 J	2.8 J	3.5	1.4	3.4	1.5	5.1	2.6	4.4	2.6
Barium	29	15 J	7.8 J	16	11	27	14	30	4.9	12	12
Beryllium	0.28	0.49	0.42	0.24	0.23	0.27	0.24	0.36	0.22	0.19	0.27
Cadmium	0.038 J	0.072	0.016 J	0.044 J	0.037 J	0.035 J	0.028 J	0.031 J	0.089	0.021 B	0.055
Calcium	420	120 B	42 B	210 B	150 B	400	51 B	200 B	100 B	320	94 B
Chromium (hexavalent)	2.25	1.12	1.02	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	14 L	9.1	11	12	9.4	15	8	15	7.2	9.6	11
Cobalt	2.9	0.99	0.84	1.5	1	2	0.43	2.3	0.68	0.83	0.77
Copper	5.2	1.5 J	2.2 J	3.8	1.9	5.5	1	4.5	1.2	3.7	2.2
Cyanide	0.055 U	0.057 U	0.055 U	0.054 U	0.054 U	0.057 U	0.061 U	0.054 U	0.057 U	0.055 U	0.06 U
Iron	12,000	4,500 J	16,000 J	11,000	3,200	17,000	4,200	14,000	3,800	12,000	7,300
Lead	8.9	2.6	2.4	8.4	1.5	7.6	1.9	8.2	1.8	5.9	2.2
Magnesium	820	570 J	380 J	640	500	820	480	710	530	520	530
Manganese	49	7.9 J	14 J	47	7.4	55	4.6	45	9.1	23	14
Mercury	0.0062 J	0.017 U	0.017 U	0.021 J	0.017 U	0.019 J	0.017 U	0.017 U	0.017 U	0.0071 J	0.017 U
Nickel	8.2	2.8 J	1.5 J	2.9	2.1	4.2	1.3	4.3	3.2	1.7	2.8
Potassium	450	440	390	570	370	660	370	650	400	590	470
Selenium	0.26	0.1 U	0.18 B	0.32	0.17	0.22	0.13	0.42	0.1 U	0.3	0.16
Silver	0.054	0.022 B	0.025 J	0.039 J	0.029 J	0.046 J	0.023 B	0.034 J	0.024 B	0.029 J	0.026 B
Sodium	120 B	35 B	31 B	23 B	25 U	11 B	15 B	19 B	20 B	24 B	7.4 B
Thallium	0.13	0.086	0.057	0.1	0.091	0.16	0.076	0.14	0.08	0.067	0.12
Vanadium	21	4.3 J	16 J	18	3.5	29	4.1	23	3.2	15	7.2
Zinc	17 B	21 B	12 B	15 B	11 B	22	13 B	18 B	20 B	13 B	13 B
Wet Chemistry											
pH (ph)	6.8	NA	NA	5	NA	4.9	NA	5	NA	5.7	NA
Total organic carbon (TOC) (mg/kg)	2,000	NA	NA	1,300	NA	1,000 J	NA	3,000	NA	4,200	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.1-2

Site 2 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S02-DP02
Sample ID	CBD-S02-GW01-1012
Sample Date	10/16/12
Chemical Name	
Volatile Organic Compounds (UG/L)	
1,1,1-Trichloroethane	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U
1,1,2-Trichloroethane	0.5 U
1,1-Dichloroethane	0.5 U
1,1-Dichloroethene	0.5 U
1,2,3-Trichlorobenzene	0.5 U
1,2,4-Trichlorobenzene	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U
1,2-Dibromoethane	0.5 U
1,2-Dichlorobenzene	0.5 U
1,2-Dichloroethane	0.5 U
1,2-Dichloropropane	0.5 U
1,3-Dichlorobenzene	0.5 U
1,4-Dichlorobenzene	0.5 U
2-Butanone	1 U
2-Hexanone	1 U
4-Methyl-2-pentanone	1 U
Acetone	2 U
Benzene	0.2 U
Bromochloromethane	0.5 U
Bromodichloromethane	0.5 U
Bromoform	1 U
Bromomethane	0.62 B
Carbon disulfide	1 U
Carbon tetrachloride	0.5 U
Chlorobenzene	0.5 U
Chloroethane	0.5 U
Chloroform	0.2 U
Chloromethane	0.46 B
cis-1,2-Dichloroethene	0.5 U
cis-1,3-Dichloropropene	0.5 U
Cyclohexane	0.5 U
Dibromochloromethane	0.5 U
Dichlorodifluoromethane (Freon-12)	0.5 U
Ethylbenzene	0.5 U
Isopropylbenzene	0.5 U
m- and p-Xylene	1 U
Methyl acetate	1.9 B
Methylcyclohexane	1 U
Methylene chloride	1 U
Methyl-tert-butyl ether (MTBE)	0.5 U
o-Xylene	0.2 U
Styrene	0.5 U
Tetrachloroethene	0.5 U
Toluene	0.5 U
trans-1,2-Dichloroethene	0.5 U

TABLE D.1-2

Site 2 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S02-DP02
Sample ID	CBD-S02-GW01-1012
Sample Date	10/16/12
trans-1,3-Dichloropropene	0.5 U
Trichloroethene	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U
Vinyl chloride	0.5 U
Semivolatile Organic Compounds (UG/L)	
1,1-Biphenyl	0.1 U
1,2,4,5-Tetrachlorobenzene	0.1 U
2,2'-Oxybis(1-chloropropane)	0.1 U
2,3,4,6-Tetrachlorophenol	0.5 U
2,4,5-Trichlorophenol	0.5 U
2,4,6-Trichlorophenol	0.5 U
2,4-Dichlorophenol	0.25 U
2,4-Dimethylphenol	0.5 U
2,4-Dinitrophenol	5 U
2,4-Dinitrotoluene	0.1 U
2,6-Dinitrotoluene	0.25 U
2-Chloronaphthalene	0.1 U
2-Chlorophenol	0.1 U
2-Methylnaphthalene	0.1 U
2-Methylphenol	0.1 U
2-Nitroaniline	0.5 U
2-Nitrophenol	0.25 U
3,3'-Dichlorobenzidine	10 U
3-Nitroaniline	0.5 U
4,6-Dinitro-2-methylphenol	1 U
4-Bromophenyl-phenylether	0.1 U
4-Chloro-3-methylphenol	0.5 U
4-Chloroaniline	0.5 U
4-Chlorophenyl-phenylether	0.05 U
4-Methylphenol	0.5 U
4-Nitroaniline	0.5 U
4-Nitrophenol	2 U
Acenaphthene	0.05 U
Acenaphthylene	0.05 U
Acetophenone	0.1 U
Anthracene	0.05 U
Atrazine	0.1 U
Benzaldehyde	0.25 U
Benzo(a)anthracene	0.02 U
Benzo(a)pyrene	0.02 U
Benzo(b)fluoranthene	0.02 U
Benzo(g,h,i)perylene	0.1 U
Benzo(k)fluoranthene	0.02 U
bis(2-Chloroethoxy)methane	0.05 U
bis(2-Chloroethyl)ether	0.1 U
bis(2-Ethylhexyl)phthalate	0.5 U
Butylbenzylphthalate	0.5 U
Caprolactam	1 UL
Carbazole	0.5 U

TABLE D.1-2

Site 2 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S02-DP02
Sample ID	CBD-S02-GW01-1012
Sample Date	10/16/12
Chrysene	0.1 U
Dibenz(a,h)anthracene	0.02 U
Dibenzofuran	0.1 U
Diethylphthalate	0.07 B
Dimethyl phthalate	0.25 U
Di-n-butylphthalate	0.5 U
Di-n-octylphthalate	0.5 U
Fluoranthene	0.05 U
Fluorene	0.05 U
Hexachlorobenzene	0.1 U
Hexachlorobutadiene	0.05 U
Hexachlorocyclopentadiene	0.1 U
Hexachloroethane	0.1 U
Indeno(1,2,3-cd)pyrene	0.02 U
Isophorone	0.1 U
Naphthalene	0.02 U
n-Nitroso-di-n-propylamine	0.1 U
n-Nitrosodiphenylamine	0.1 U
Nitrobenzene	0.25 U
Pentachlorophenol	0.5 U
Phenanthrene	0.05 U
Phenol	0.05 U
Pyrene	0.1 U
Pesticide/Polychlorinated Biphenyls (UG/L)	
Aroclor-1016	0.08 U
Aroclor-1221	0.08 U
Aroclor-1232	0.08 U
Aroclor-1242	0.08 U
Aroclor-1248	0.08 U
Aroclor-1254	0.08 U
Aroclor-1260	0.08 U
Aroclor-1262	0.08 U
Aroclor-1268	0.08 U
Total Metals (UG/L)	
Aluminum	650
Antimony	0.26 J
Arsenic	1.2
Barium	100
Beryllium	0.4 U
Cadmium	0.27
Calcium	21,000
Chromium	6
Cobalt	8.2
Copper	1.6 B
Cyanide	4 U
Iron	3,100
Lead	0.68 B
Magnesium	5,400

TABLE D.1-2

Site 2 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S02-DP02
Sample ID	CBD-S02-GW01-1012
Sample Date	10/16/12
Manganese	180
Mercury	0.1 U
Nickel	24
Potassium	8,000
Selenium	2.1
Silver	0.1 U
Sodium	7,200
Thallium	0.3 J
Vanadium	2.6
Zinc	59 B
Dissolved Metals (UG/L)	
Aluminum, Dissolved	50 U
Antimony, Dissolved	0.27 J
Arsenic, Dissolved	0.27 J
Barium, Dissolved	73
Beryllium, Dissolved	0.4 U
Cadmium, Dissolved	0.51
Calcium, Dissolved	18,000
Chromium (hexavalent), Dissolved	10 UJ
Chromium, Dissolved	0.53 J
Cobalt, Dissolved	7.1
Copper, Dissolved	1.7 B
Iron, Dissolved	2,000
Lead, Dissolved	0.5 U
Magnesium, Dissolved	6,600
Manganese, Dissolved	76
Mercury, Dissolved	0.1 U
Nickel, Dissolved	15
Potassium, Dissolved	7,100
Selenium, Dissolved	1.9 B
Silver, Dissolved	0.1 U
Sodium, Dissolved	7,500
Thallium, Dissolved	0.43 J
Vanadium, Dissolved	0.078 J
Zinc, Dissolved	53

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

UG/L - Micrograms per liter

TABLE D.2-1

Site 3 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S03-DP01			CBD-S03-DP02		CBD-S03-DP03		CBD-S03-DP04		CBD-S03-DP05	
Sample ID	CBD-S03-SS01-1012	CBD-S03-SB01-1315	CBD-S03-SB01P-1315	CBD-S03-SS02-1012	CBD-S03-SB02-2022	CBD-S03-SS03-1012	CBD-S03-SB03-2022	CBD-S03-SS04-1012	CBD-S03-SB04-1820	CBD-S03-SS05-1012	CBD-S03-SB05-1315
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12
Sample Depth (feet)	0 - 0.5	13 - 15	13 - 15	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	13 - 15
Chemical Name											
Volatile Organic Compounds (UG/KG)											
1,1,1-Trichloroethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,1,2,2-Tetrachloroethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,1,2-Trichloroethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,1-Dichloroethane	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
1,1-Dichloroethene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,2,3-Trichlorobenzene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,2,4-Trichlorobenzene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,2-Dibromo-3-chloropropane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,2-Dibromoethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,2-Dichlorobenzene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,2-Dichloroethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,2-Dichloropropane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
1,3-Dichlorobenzene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
1,4-Dichlorobenzene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
2-Butanone	1.1 B	0.9 U	0.56 U	1.7 B	0.77 U	0.55 U	0.67 U	1.6 B	2.9 B	1.4 B	0.47 UJ
2-Hexanone	0.42 UJ	0.9 UJ	0.56 UJ	0.5 UJ	0.77 UJ	0.55 UJ	0.67 UJ	0.44 UJ	0.65 UJ	0.44 UJ	0.47 UJ
4-Methyl-2-pentanone	0.42 UJ	0.9 UJ	0.56 UJ	0.5 UJ	0.77 UJ	3 J	0.67 UJ	0.44 UJ	0.65 UJ	0.44 UJ	0.47 UJ
Acetone	41 B	9 U	5.6 U	71 B	9.1 B	31 B	9.5 B	62 B	29 B	65 J	7.6 B
Benzene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.38 J	0.44 U	0.47 U
Bromochloromethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Bromodichloromethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Bromoform	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Bromomethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Carbon disulfide	0.66 B	0.7 B	0.44 B	0.45 B	0.72 B	0.47 B	0.59 B	0.42 B	0.86 B	0.4 B	0.36 B
Carbon tetrachloride	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Chlorobenzene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Chloroethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Chloroform	0.21 U	0.45 U	0.22 B	0.25 U	0.49 B	0.28 U	0.24 B	0.18 B	0.33 U	0.14 J	0.23 U
Chloromethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
cis-1,2-Dichloroethene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
cis-1,3-Dichloropropene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Cyclohexane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Dibromochloromethane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Dichlorodifluoromethane (Freon-12)	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Ethylbenzene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.22 J	0.44 U	0.47 U
Isopropylbenzene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
m- and p-Xylene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.43 J	0.44 U	0.47 U
Methyl acetate	1.5 B	1.7 B	1.1 B	2.6 B	1.7 B	2.4 B	1.6 B	1.3 B	2.7 B	1.6 B	1.2 B
Methylcyclohexane	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.18 J	0.44 U	0.47 U
Methylene chloride	0.42 U	0.9 U	0.56 U	0.5 U	0.49 B	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	18
Methyl-tert-butyl ether (MTBE)	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
o-Xylene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U

TABLE D.2-1

Site 3 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S03-DP01			CBD-S03-DP02		CBD-S03-DP03		CBD-S03-DP04		CBD-S03-DP05	
Sample ID	CBD-S03-SS01-1012	CBD-S03-SB01-1315	CBD-S03-SB01P-1315	CBD-S03-SS02-1012	CBD-S03-SB02-2022	CBD-S03-SS03-1012	CBD-S03-SB03-2022	CBD-S03-SS04-1012	CBD-S03-SB04-1820	CBD-S03-SS05-1012	CBD-S03-SB05-1315
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12
Sample Depth (feet)	0 - 0.5	13 - 15	13 - 15	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	13 - 15
Styrene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Tetrachloroethene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Toluene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	1.1 J	0.44 U	0.47 U
trans-1,2-Dichloroethene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
trans-1,3-Dichloropropene	0.42 U	0.9 U	0.56 U	0.5 U	0.77 U	0.55 U	0.67 U	0.44 U	0.65 U	0.44 U	0.47 U
Trichloroethene	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Trichlorofluoromethane (Freon-11)	0.21 U	0.45 U	0.28 U	0.25 U	1.5 J	0.28 J	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Vinyl chloride	0.21 U	0.45 U	0.28 U	0.25 U	0.38 U	0.28 U	0.33 U	0.22 U	0.33 U	0.22 U	0.23 U
Semivolatile Organic Compounds (UG/KG)											
1,1-Biphenyl	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
1,2,4,5-Tetrachlorobenzene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
2,2'-Oxybis(1-chloropropane)	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
2,3,4,6-Tetrachlorophenol	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
2,4,5-Trichlorophenol	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
2,4,6-Trichlorophenol	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
2,4-Dichlorophenol	3.6 U	3.9 U	3.7 U	3.6 U	5.7 U	3.6 U	4.8 U	3.6 U	4.9 U	3.6 U	4 U
2,4-Dimethylphenol	37 U	39 U	37 U	36 U	57 U	37 U	48 U	36 U	49 U	37 U	40 U
2,4-Dinitrophenol	180 U	200 U	190 U	180 U	290 U	180 U	240 U	180 U	250 U	180 U	200 U
2,4-Dinitrotoluene	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
2,6-Dinitrotoluene	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
2-Chloronaphthalene	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
2-Chlorophenol	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
2-Methylnaphthalene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
2-Methylphenol	7.3 U	7.8 U	7.4 U	7.2 U	11 U	7.3 U	9.5 U	7.2 U	9.8 U	7.2 U	8 U
2-Nitroaniline	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
2-Nitrophenol	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
3,3'-Dichlorobenzidine	370 U	390 U	370 U	360 U	570 U	370 U	480 U	360 U	490 U	370 U	400 U
3-Nitroaniline	37 U	39 U	37 U	36 U	57 U	37 U	48 U	36 U	49 U	37 U	40 U
4,6-Dinitro-2-methylphenol	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
4-Bromophenyl-phenylether	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
4-Chloro-3-methylphenol	7.3 U	7.8 U	7.4 U	7.2 U	11 U	7.3 U	9.5 U	7.2 U	9.8 U	7.2 U	8 U
4-Chloroaniline	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
4-Chlorophenyl-phenylether	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
4-Methylphenol	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
4-Nitroaniline	37 U	39 U	37 U	36 U	57 U	37 U	48 U	36 U	49 U	37 U	40 U
4-Nitrophenol	37 U	39 U	37 U	36 U	57 U	37 U	48 U	36 U	49 U	37 U	40 U
Acenaphthene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.5 J	2.5 U	1.8 U	2 U
Acenaphthylene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Acetophenone	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
Anthracene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	4.8 B	2.5 U	1.1 B	2 U
Atrazine	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
Benzaldehyde	18 R	20 R	19 R	18 R	29 R	18 R	24 R	18 R	25 R	18 R	20 R
Benzo(a)anthracene	1.8 U	2 U	1.9 U	3 B	2.9 U	1.8 B	2.4 U	41 B	2.5 U	7.1 B	2 U
Benzo(a)pyrene	7.4 U	4 U	3.8 U	3.7 U	4.6 U	40	3.9 U	48	5 U	2.9 U	3.2 U
Benzo(b)fluoranthene	2.3 B	3.9 U	3.7 U	7.4 B	5.7 U	4 B	4.8 U	120	4.9 U	23 B	4 U

TABLE D.2-1

Site 3 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S03-DP01			CBD-S03-DP02		CBD-S03-DP03		CBD-S03-DP04		CBD-S03-DP05	
Sample ID	CBD-S03-SS01-1012	CBD-S03-SB01-1315	CBD-S03-SB01P-1315	CBD-S03-SS02-1012	CBD-S03-SB02-2022	CBD-S03-SS03-1012	CBD-S03-SB03-2022	CBD-S03-SS04-1012	CBD-S03-SB04-1820	CBD-S03-SS05-1012	CBD-S03-SB05-1315
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12
Sample Depth (feet)	0 - 0.5	13 - 15	13 - 15	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	13 - 15
Benzo(g,h,i)perylene	1.8 U	2 U	1.9 U	3 B	2.9 U	1.8 B	2.4 U	42	2.5 U	8.2 B	2 U
Benzo(k)fluoranthene	3.7 U	3.9 U	3.7 U	3 B	5.7 U	2.6 B	4.8 U	58	4.9 U	7.4 B	4 U
bis(2-Chloroethoxy)methane	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
bis(2-Chloroethyl)ether	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
bis(2-Ethylhexyl)phthalate	11 B	6.3 B	9.2 B	8.5 B	7.6 B	9.2 B	9.8 B	46 B	6.7 B	9.7 B	20 U
Butylbenzylphthalate	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
Caprolactam	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
Carbazole	37 U	39 U	37 U	36 U	57 U	37 U	48 U	36 U	49 U	37 U	40 U
Chrysene	2.3 B	2 U	1.9 U	3.7 B	2.9 U	2.2 B	2.4 U	45 B	2.5 U	9.7 B	2 U
Dibenz(a,h)anthracene	7.4 U	4 U	3.8 U	3.7 U	4.6 U	4.5 J	3.9 U	7.4 J	5 U	2.9 U	3.2 U
Dibenzofuran	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Diethylphthalate	6.1 B	8.3 B	8.1 B	7.4 B	23 B	6.6 B	19 B	10 B	13 B	5.9 B	12 B
Dimethyl phthalate	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
Di-n-butylphthalate	18 U	20 U	19 U	18 U	29 U	18 U	24 U	18 U	25 U	18 U	20 U
Di-n-octylphthalate	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Fluoranthene	1.8 U	2 U	1.9 U	3.7 B	2.9 U	3.3 B	2.4 U	39	2.5 U	11 B	2 U
Fluorene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.1 J	2.5 U	1.8 U	2 U
Hexachlorobenzene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Hexachlorobutadiene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Hexachlorocyclopentadiene	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
Hexachloroethane	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Indeno(1,2,3-cd)pyrene	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	37	4.9 U	7.1 B	4 U
Isophorone	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Naphthalene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
n-Nitroso-di-n-propylamine	3.7 U	3.9 U	3.7 U	3.6 U	5.7 U	3.7 U	4.8 U	3.6 U	4.9 U	3.7 U	4 U
n-Nitrosodiphenylamine	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Nitrobenzene	1.8 U	2 U	1.9 U	1.8 U	2.9 U	1.8 U	2.4 U	1.8 U	2.5 U	1.8 U	2 U
Pentachlorophenol	37 U	39 U	37 U	36 U	57 U	37 U	48 U	36 U	49 U	37 U	40 U
Phenanthrene	1.1 B	2 U	1.9 U	1.9 B	2.9 U	2.2 B	2.4 U	21	2.5 U	5.9 B	2 U
Phenol	3.6 U	3.9 U	3.7 U	3.6 U	5.7 U	3.6 U	4.8 U	3.6 U	4.9 U	3.6 U	4 U
Pyrene	1.5 B	3.9 U	3.7 U	4.5 B	5.7 U	3.7 B	4.8 U	68	4.9 U	13 B	4 U
Pesticide/Polychlorinated Biphenyls (UG/KG)											
Aroclor-1016	14 U	15 U	15 U	14 U	22 U	290 U	19 U	140 U	19 U	14 U	16 U
Aroclor-1221	14 U	15 U	15 U	14 U	22 U	290 U	19 U	140 U	19 U	14 U	16 U
Aroclor-1232	14 U	15 U	15 U	14 U	22 U	290 U	19 U	140 U	19 U	14 U	16 U
Aroclor-1242	14 U	15 U	15 U	14 U	22 U	290 U	19 U	140 U	19 U	14 U	16 U
Aroclor-1248	14 U	15 U	15 U	14 U	22 U	290 U	19 U	140 U	19 U	14 U	16 U
Aroclor-1254	14 U	15 U	15 U	14 U	22 U	290 U	19 U	140 U	19 U	14 U	16 U
Aroclor-1260	120	15 U	15 U	41	22 U	5,500	81	2,100	17 J	150	16 U
Aroclor-1262	14 U	15 U	15 U	14 U	22 U	290 U	19 U	140 U	19 U	14 U	16 U
Aroclor-1268	14 U	15 U	15 U	14 U	22 U	290 U	19 U	140 U	19 U	14 U	16 U
Total Metals (MG/KG)											
Aluminum	5,700	1,500	1,600	5,800	5,700	4,500	5,400	6,300	6,100	7,900	2,500
Antimony	0.12	0.071 J	0.065 J	0.35	0.18	0.9	0.083 J	0.36	0.1	0.08 J	0.081 J

TABLE D.2-1

Site 3 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S03-DP01			CBD-S03-DP02		CBD-S03-DP03		CBD-S03-DP04		CBD-S03-DP05	
Sample ID	CBD-S03-SS01-1012	CBD-S03-SB01-1315	CBD-S03-SB01P-1315	CBD-S03-SS02-1012	CBD-S03-SB02-2022	CBD-S03-SS03-1012	CBD-S03-SB03-2022	CBD-S03-SS04-1012	CBD-S03-SB04-1820	CBD-S03-SS05-1012	CBD-S03-SB05-1315
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12
Sample Depth (feet)	0 - 0.5	13 - 15	13 - 15	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	13 - 15
Arsenic	1.6	1.5	1.6	2.1	5.2	14	2.1	2.2	2.9	1.2	1.2
Barium	37	4.5	4.6	27	14	9.8	13	27	13	44	5
Beryllium	0.51	0.12	0.13	0.33	0.7	0.26	1.1	0.3	0.45	0.64	0.12
Cadmium	0.091	0.017 B	0.018 B	0.13	0.18	0.055	0.34	0.16	0.93	0.17	0.016 B
Calcium	4,100	300	290	390	430	420	970	390	36,000	180	73 B
Chromium (hexavalent)	0.15 J	0.18 J	0.58	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	7.6	6.7	8.4	11	24	12	22	8.7	26	6.2	14
Cobalt	2.6	0.48	0.5	1.9	1.2	1.4	1.7	2.3	5	3.4	0.4
Copper	2.9	1	1.1	2.6	3.1	3.9	2.8	3	3	1.9	1.6
Cyanide	0.055 U	0.059 U	0.056 U	0.055 U	0.086 U	0.055 U	0.072 U	0.054 U	0.074 U	0.043 J	0.061 U
Iron	5,600	2,300	2,600	6,400	18,000	8,100	9,700	8,400	13,000	5,600	4,400
Lead	5.9	1.4	1.8	7.2	5	2.9	3.7	11	4.4	4.3	1.9
Magnesium	1,400	390	460	660	1,700	480	1,800	630	19,000	630	530
Manganese	160	5.4	4.2	57	8.3	20	13	69	320	140	4
Mercury	0.012 J	0.016 U	0.01 J	0.0095 J	0.017 U	0.017 U	0.017 U	0.011 J	0.017 U	0.0078 J	0.017 U
Nickel	10	0.62	0.67	5.7	2.5	2.3	4.4	4.5	18	6.2	0.86
Potassium	300	310	330	400	1,500	350	1,100	340	1,800	250	410
Selenium	0.25	0.098 B	0.12 B	0.18 B	1.4	0.96	0.42	0.28	0.62	0.4	0.39
Silver	0.024 J	0.033 J	0.035 J	0.031 J	0.054	0.026 J	0.047 J	0.034 J	0.072	0.024 J	0.042 J
Sodium	200	25 U	13 B	17 B	77 B	26 B	46 B	24 B	200	15 B	20 B
Thallium	0.19	0.19	0.17	0.2	0.32	0.08	0.22	0.2	0.19	0.24	0.11
Vanadium	9	4.7	5.2	11	14	18	9.3	12	11	8.2	5.4
Zinc	35	6.6	7.5	20 B	54	8.6 B	51	30	45	45	8.4
Wet Chemistry											
pH (ph)	5.9	NA	NA	6.3	NA	6.6	NA	5.4	NA	5.7	NA
Total organic carbon (TOC) (mg/kg)	1,300	NA	NA	1,300	NA	1,100 U	NA	6,800	NA	11,000	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.3-1

Site 4 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S04-DP01			CBD-S04-DP02		CBD-S04-DP03		CBD-S04-DP04		CBD-S04-DP05		CBD-S04-SO06
Sample ID	CBD-S04-SS01-1012	CBD-S04-SS01P-1012	CBD-S04-SB01-1820	CBD-S04-SS02-1012	CBD-S04-SB02-1618	CBD-S04-SS03-1012	CBD-S04-SB03-1416	CBD-S04-SS04-1012	CBD-S04-SB04-1012	CBD-S04-SS05-1012	CBD-S04-SB05-1315	CBD-S04-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12
Sample Depth (feet)	0 - 0.5	0 - 06	18 - 20	0 - 0.5	16 - 18	0 - 0.5	14 - 16	0 - 0.5	10-12	0 - 0.5	13 - 15	0 - 0.5
Chemical Name												
Volatile Organic Compounds (UG/KG)												
1,1,1-Trichloroethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,1,2,2-Tetrachloroethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,1,2-Trichloroethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,1-Dichloroethane	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
1,1-Dichloroethene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,2,3-Trichlorobenzene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,2,4-Trichlorobenzene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,2-Dibromo-3-chloropropane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,2-Dibromoethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,2-Dichlorobenzene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,2-Dichloroethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,2-Dichloropropane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
1,3-Dichlorobenzene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
1,4-Dichlorobenzene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
2-Butanone	0.42 UJ	0.42 UJ	0.6 U	0.57 UJ	0.69 UJ	3.8 B	0.56 UJ	1.3 B	0.52 UJ	3.1 B	1.2 U	0.53 UJ
2-Hexanone	0.42 UJ	0.42 UJ	0.6 U	0.57 UJ	0.69 UJ	0.44 UJ	0.56 UJ	0.55 UJ	0.52 UJ	0.43 U	1.2 U	0.53 UJ
4-Methyl-2-pentanone	0.42 UJ	0.42 UJ	0.6 U	0.57 UJ	0.69 UJ	0.44 UJ	0.56 UJ	0.55 UJ	0.52 UJ	0.43 U	1.2 U	0.53 UJ
Acetone	50 J	7.4 J	23	22 J	28 J	100 J	5.6 UJ	57 J	5.2 UJ	100	12 U	41 J
Benzene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.18 J	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Bromochloromethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Bromodichloromethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Bromoform	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Bromomethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Carbon disulfide	0.31 B	0.33 B	0.41 B	0.4 B	0.5 B	0.36 B	0.4 B	0.63 B	0.38 B	0.38 B	0.87 B	0.45 B
Carbon tetrachloride	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Chlorobenzene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Chloroethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Chloroform	0.21 U	0.21 U	0.3 U	0.23 B	0.35 U	0.18 B	0.25 B	0.17 B	0.23 B	0.21 U	0.62 U	0.26 U
Chloromethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
cis-1,2-Dichloroethene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
cis-1,3-Dichloropropene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Cyclohexane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Dibromochloromethane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Dichlorodifluoromethane (Freon-12)	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Ethylbenzene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Isopropylbenzene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
m- and p-Xylene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Methyl acetate	6.3 B	0.99 B	1.8 B	1.3 B	1.5 B	1.8 B	1.2 B	1.6 B	1 B	1.8 B	8.4 B	1.6 B
Methylcyclohexane	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Methylene chloride	3.7 B	0.42 U	0.6 U	0.57 U	1.8 B	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Methyl-tert-butyl ether (MTBE)	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
o-Xylene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Styrene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Tetrachloroethene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Toluene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.2 J	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
trans-1,2-Dichloroethene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
trans-1,3-Dichloropropene	0.42 U	0.42 U	0.6 U	0.57 U	0.69 U	0.44 U	0.56 U	0.55 U	0.52 U	0.43 U	1.2 U	0.53 U
Trichloroethene	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U

TABLE D.3-1

Site 4 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S04-DP01			CBD-S04-DP02		CBD-S04-DP03		CBD-S04-DP04		CBD-S04-DP05		CBD-S04-SO06
Sample ID	CBD-S04-SS01-1012	CBD-S04-SS01P-1012	CBD-S04-SB01-1820	CBD-S04-SS02-1012	CBD-S04-SB02-1618	CBD-S04-SS03-1012	CBD-S04-SB03-1416	CBD-S04-SS04-1012	CBD-S04-SB04-1012	CBD-S04-SS05-1012	CBD-S04-SB05-1315	CBD-S04-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12
Sample Depth (feet)	0 - 0.5	0 - 06	18 - 20	0 - 0.5	16 - 18	0 - 0.5	14 - 16	0 - 0.5	10-12	0 - 0.5	13 - 15	0 - 0.5
Trichlorofluoromethane (Freon-11)	0.26 J	0.21 U	0.3 U	0.29 U	0.32 J	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Vinyl chloride	0.21 U	0.21 U	0.3 U	0.29 U	0.35 U	0.22 U	0.28 U	0.27 U	0.26 U	0.21 U	0.62 U	0.26 U
Semivolatile Organic Compounds (UG/KG)												
1,1-Biphenyl	19 U	19 U	20 U	19 U	19 U	13 J	19 U	18 U	19 U	19 U	20 U	18 U
1,2,4,5-Tetrachlorobenzene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
2,2'-Oxybis(1-chloropropane)	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
2,3,4,6-Tetrachlorophenol	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
2,4,5-Trichlorophenol	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	19 U	19 U	20 U	18 U
2,4,6-Trichlorophenol	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
2,4-Dichlorophenol	3.7 U	3.7 U	3.9 U	3.8 U	3.7 U	3.6 U	3.7 U	3.6 U	3.7 U	3.7 U	3.9 U	3.5 U
2,4-Dimethylphenol	38 U	37 U	40 U	38 U	38 U	37 U	37 U	37 U	38 U	38 U	40 U	35 U
2,4-Dinitrophenol	190 U	190 U	200 U	190 U	190 U	180 U	190 U	180 U	190 U	190 U	200 U	180 U
2,4-Dinitrotoluene	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	19 U	19 U	20 U	18 U
2,6-Dinitrotoluene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
2-Chloronaphthalene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
2-Chlorophenol	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
2-Methylnaphthalene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	32	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
2-Methylphenol	7.5 U	7.4 U	7.9 U	7.6 U	7.5 U	7.3 U	7.3 U	7.2 U	7.5 U	7.4 U	7.9 U	7 U
2-Nitroaniline	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	19 U	19 U	20 U	18 U
2-Nitrophenol	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
3,3'-Dichlorobenzidine	380 U	370 U	400 U	380 U	380 U	370 U	370 U	370 U	380 U	380 U	400 U	350 U
3-Nitroaniline	38 U	37 U	40 U	38 U	38 U	37 U	37 U	37 U	38 U	38 U	40 U	35 U
4,6-Dinitro-2-methylphenol	19 U	19 U	20 U	23 J	19 U	18 U	19 U	18 U	22 J	19 U	20 U	18 U
4-Bromophenyl-phenylether	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
4-Chloro-3-methylphenol	7.5 U	7.4 U	7.9 U	7.6 U	7.5 U	7.3 U	7.3 U	7.2 U	7.5 U	7.4 U	7.9 U	7 U
4-Chloroaniline	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	18 J	19 U	20 U	18 U
4-Chlorophenyl-phenylether	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
4-Methylphenol	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
4-Nitroaniline	38 U	37 U	40 U	38 U	38 U	37 U	37 U	37 U	38 U	38 U	40 U	35 U
4-Nitrophenol	38 U	37 U	40 U	38 U	38 U	37 U	37 U	37 U	38 U	38 U	40 U	35 U
Acenaphthene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	310	1.9 U	5.6 J	1.9 U	1.9 U	2 U	6.1 J
Acenaphthylene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	3.4 J	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Acetophenone	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	19 U	19 U	20 U	18 U
Anthracene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	580	1.9 U	13 J	1.9 U	1.9 U	2 U	15 J
Atrazine	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	19 U	19 U	20 U	18 U
Benzaldehyde	19 R	19 R	20 R	19 R	19 R	18 R	19 R	18 R	47 L	19 R	20 R	18 R
Benzo(a)anthracene	1.9 U	1.9 U	2 U	1.9 J	1.9 U	3,100	1.9 U	58	1.9 U	1.9 U	2 U	89
Benzo(a)pyrene	0.76 U	3.7 U	0.8 U	0.77 U	0.76 U	3,500	3.7 U	71	0.76 U	3.8 U	0.8 U	73
Benzo(b)fluoranthene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3,900	3.7 U	80	3.8 U	3.8 U	4 U	130
Benzo(g,h,i)perylene	1.9 U	1.9 U	2 U	1.2 J	1.9 U	800	1.9 U	29 J	1.9 U	1.9 U	2 U	48
Benzo(k)fluoranthene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	730	3.7 U	41	3.8 U	3.8 U	4 U	50
bis(2-Chloroethoxy)methane	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
bis(2-Chloroethyl)ether	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
bis(2-Ethylhexyl)phthalate	5 B	5.7 B	6.1 B	5 B	7.4 B	16 B	4.6 B	8.2 B	6.6 B	5.7 B	13 B	8.6 B
Butylbenzylphthalate	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
Caprolactam	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	19 U	19 U	20 U	18 U
Carbazole	38 U	37 U	40 U	38 U	38 U	380	37 U	37 U	38 U	38 U	40 U	35 U
Chrysene	1.9 U	1.9 U	2 U	1.5 J	1.9 U	2,600	1.5 J	56	1.9 U	1.9 U	2 U	85
Dibenz(a,h)anthracene	0.76 U	3.7 U	0.8 U	0.77 U	0.76 U	230 J	3.7 U	5.4 J	0.76 U	3.8 U	0.8 U	6.9 J
Dibenzofuran	1.9 U	1.9 U	2 U	1.9 U	1.9 U	170	1.9 U	2.2 J	1.9 U	1.9 U	2 U	2.9 J
Diethylphthalate	3.1 B	3.1 B	3.7 B	4.2 B	3.9 B	8.7 B	13 B	7.8 B	8.5 B	3.8 U	3.7 B	5.7 B

TABLE D.3-1
Site 4 Validated Raw Analytical Data - Soil
Base-Wide Site Inspection Report
NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S04-DP01			CBD-S04-DP02		CBD-S04-DP03		CBD-S04-DP04		CBD-S04-DP05		CBD-S04-SO06
Sample ID	CBD-S04-SS01-1012	CBD-S04-SS01P-1012	CBD-S04-SB01-1820	CBD-S04-SS02-1012	CBD-S04-SB02-1618	CBD-S04-SS03-1012	CBD-S04-SB03-1416	CBD-S04-SS04-1012	CBD-S04-SB04-1012	CBD-S04-SS05-1012	CBD-S04-SB05-1315	CBD-S04-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12
Sample Depth (feet)	0 - 0.5	0 - 06	18 - 20	0 - 0.5	16 - 18	0 - 0.5	14 - 16	0 - 0.5	10-12	0 - 0.5	13 - 15	0 - 0.5
Dimethyl phthalate	3.8 U	3.7 U	4 U	2.3 J	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	2.4 J	3.5 U
Di-n-butylphthalate	19 U	19 U	20 U	19 U	19 U	18 U	19 U	18 U	19 U	19 U	20 U	18 U
Di-n-octylphthalate	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Fluoranthene	1.2 J	1.1 J	2 U	3.1 J	1.9 U	4,800	2.7 J	97	1.9 U	1.9 U	2 U	140
Fluorene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	210	1.9 U	4.1 J	1.9 U	1.9 U	2 U	3.2 J
Hexachlorobenzene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Hexachlorobutadiene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Hexachlorocyclopentadiene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	3.8 U	3.8 U	4 U	3.5 U
Hexachloroethane	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Indeno(1,2,3-cd)pyrene	3.8 U	3.7 U	4 U	3.8 U	3.8 U	830	3.7 U	28 J	3.8 U	3.8 U	4 U	43
Isophorone	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Naphthalene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	84	1.9 U	2.2 J	1.9 U	1.9 U	2 U	1.1 J
n-Nitroso-di-n-propylamine	3.8 U	3.7 U	4 U	3.8 U	3.8 U	3.7 U	3.7 U	3.7 U	49	3.8 U	4 U	3.5 U
n-Nitrosodiphenylamine	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Nitrobenzene	1.9 U	1.9 U	2 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	2 U	1.8 U
Pentachlorophenol	38 U	37 U	40 U	38 U	38 U	37 U	37 U	37 U	38 U	38 U	40 U	35 U
Phenanthrene	1.2 J	1.1 J	2 U	1.9 J	1.2 J	3,500	2.3 J	57	1.9 U	1.9 U	2 U	79
Phenol	3.7 U	3.7 U	3.9 U	3.8 U	3.7 U	3.6 U	3.7 U	3.6 U	1.9 J	3.7 U	3.9 U	3.5 U
Pyrene	3.7 U	3.7 U	3.9 U	2.3 J	3.7 U	4,500	1.9 J	89	3.7 U	3.7 U	3.9 U	130
Pesticide/Polychlorinated Biphenyls (UG/KG)												
Aroclor-1016	15 U	14 U	15 U	15 U	15 U	14 U	14 U	14 U	15 U	15 U	15 U	14 U
Aroclor-1221	15 U	14 U	15 U	15 U	15 U	14 U	14 U	14 U	15 U	15 U	15 U	14 U
Aroclor-1232	15 U	14 U	15 U	15 U	15 U	14 U	14 U	14 U	15 U	15 U	15 U	14 U
Aroclor-1242	15 U	14 U	15 U	15 U	15 U	14 U	14 U	14 U	15 U	15 U	15 U	14 U
Aroclor-1248	15 U	14 U	15 U	15 U	15 U	14 U	14 U	14 U	15 U	15 U	15 U	14 U
Aroclor-1254	15 U	14 U	15 U	15 U	15 U	14 U	14 U	14 U	15 U	15 U	15 U	14 U
Aroclor-1260	15 U	14 U	15 U	7.2 J	15 U	260	14 U	23	15 U	15 U	15 U	18
Aroclor-1262	15 U	14 U	15 U	15 U	15 U	14 U	14 U	14 U	15 U	15 U	15 U	14 U
Aroclor-1268	15 U	14 U	15 U	15 U	15 U	14 U	14 U	14 U	15 U	15 U	15 U	14 U
Total Metals (MG/KG)												
Aluminum	8,000 J	10,000 J	2,400	7,100	1,600	6,400	2,100	6,900	1,700	15,000	1,700	4,400
Antimony	0.25	0.26	0.13 B	0.16	0.097 J	0.16	0.17	2.1	0.34	0.25	0.055 B	1
Arsenic	5.2	5.1	1.8	3.2	1.6	2.2	3.5	3.3	4.1	5.1	1.6	2.6
Barium	15 J	23 J	6.7	12	4.1	29	5.3	40	5.6	43	11	36
Beryllium	0.34	0.37	0.5	0.29	1.1	0.39	0.25	0.48	0.12	0.58	0.99	0.39
Cadmium	0.048 J	0.062	0.027 J	0.2	0.058	0.044 J	0.034 J	0.12	0.039 J	0.054	0.048 J	0.29
Calcium	480	590	62	210	38 J	240	110	650	350	580	120	750
Chromium (hexavalent)	0.22 U	0.35 J	1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	16	15	9.1	11	7.5	7.8	12	10	7	20	6.5	9.4
Cobalt	0.96	1.2	2	1.4	1.7	2.8	0.75	2.7	0.58	4	0.65	2.1
Copper	6.3	6.4	1.5	4.6	1.1	3	1.4	13	1.9	6.4	0.83	14
Cyanide	0.056 U	0.056 U	0.06 U	0.057 U	0.057 U	0.055 U	0.056 U	0.055 U	0.062 J	0.056 U	0.059 U	0.026 J
Iron	17,000	17,000	4,200	11,000	3,500	8,200	6,300	10,000	4,800	21,000	5,000	7,600
Lead	16	11	2.6	8.6	2.2	5.8	1.7	59	1.7	8.8	1.9	53
Magnesium	940	1,100	540	790	360	590	500	700	490	1,400	480	490
Manganese	24	25	24	33	13	78	5.2	78	3.2	120	4.6	68
Mercury	0.018 J	0.022 J	0.017 U	0.0064 J	0.017 U	0.017 U	0.017 U	0.084	0.011 J	0.027 J	0.017 U	0.065
Nickel	1.8	2.6	2.5	2.9	0.98	4.2	1.9	5.4	0.99	7.7	1.1	5.5
Potassium	850	930	410	590	310	360	340	440	340	810	380	350
Selenium	0.41	0.39	0.12 B	0.25	0.13 B	0.24	0.18	0.38	0.14 B	0.32	0.1 U	0.22

TABLE D.3-1

Site 4 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S04-DP01			CBD-S04-DP02		CBD-S04-DP03		CBD-S04-DP04		CBD-S04-DP05		CBD-S04-SO06
Sample ID	CBD-S04-SS01-1012	CBD-S04-SS01P-1012	CBD-S04-SB01-1820	CBD-S04-SS02-1012	CBD-S04-SB02-1618	CBD-S04-SS03-1012	CBD-S04-SB03-1416	CBD-S04-SS04-1012	CBD-S04-SB04-1012	CBD-S04-SS05-1012	CBD-S04-SB05-1315	CBD-S04-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12	10/18/12
Sample Depth (feet)	0 - 0.5	0 - 06	18 - 20	0 - 0.5	16 - 18	0 - 0.5	14 - 16	0 - 0.5	10-12	0 - 0.5	13 - 15	0 - 0.5
Silver	0.08	0.052	0.033 J	0.033 J	0.03 J	0.037 J	0.038 J	0.94	0.029 J	0.045 J	0.026 J	0.49
Sodium	16 B	21 B	12 B	13 B	8.2 B	13 B	9.8 B	19 B	15 B	23 B	14 B	9.6 B
Thallium	0.12	0.13	0.093	0.12	0.12	0.23	0.29	0.18	0.16	0.27	0.07	0.13
Vanadium	18	21	4.9	16	3.5	14	7.5	16	4.2	31	3.5	24
Zinc	15 B	23 B	13 B	19 B	23 B	22 B	18 B	66	13 B	32	7.2	96 B
Wet Chemistry												
pH (ph)	5.5	NA	NA	5.7	NA	5.8	NA	6.1	NA	5.2	NA	6.2
Total organic carbon (TOC) (mg/kg)	10,000	NA	NA	1,500	NA	3,300	NA	4,300	NA	2,400	NA	11,000

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.3-2

Site 4 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S04-DP03	CBD-S04-DP03
Sample ID	CBD-S04-GW03-1012	CBD-S04-GW03-1012
Sample Date	10/19/12	10/19/12
Chemical Name		
Volatile Organic Compounds (UG/L)		
1,1,1-Trichloroethane	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U
1,2,3-Trichlorobenzene	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U
1,2-Dibromoethane	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U
2-Butanone	1 U	1 U
2-Hexanone	1 U	1 U
4-Methyl-2-pentanone	1 U	1 U
Acetone	2 U	2 U
Benzene	0.2 U	0.2 U
Bromochloromethane	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U
Bromoform	1 U	1 U
Bromomethane	0.56 B	0.56 B
Carbon disulfide	1 U	1 U
Carbon tetrachloride	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U
Chloroform	0.1 B	0.1 B
Chloromethane	0.36 B	0.36 B
cis-1,2-Dichloroethene	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U
Cyclohexane	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U
m- and p-Xylene	1 U	1 U
Methyl acetate	1.8 B	1.8 B
Methylcyclohexane	1 U	1 U
Methylene chloride	1 U	1 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U
o-Xylene	0.2 U	0.2 U
Styrene	0.5 U	0.5 U
Tetrachloroethene	0.5 U	0.5 U
Toluene	0.5 U	0.5 U
trans-1,2-Dichloroethene	0.5 U	0.5 U

TABLE D.3-2

Site 4 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S04-DP03	CBD-S04-DP03
Sample ID	CBD-S04-GW03-1012	CBD-S04-GW03-1012
Sample Date	10/19/12	10/19/12
trans-1,3-Dichloropropene	0.5 U	0.5 U
Trichloroethene	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U
Vinyl chloride	0.5 U	0.5 U
Semivolatile Organic Compounds (UG/L)		
1,1-Biphenyl	0.1 UL	0.1 UL
1,2,4,5-Tetrachlorobenzene	0.1 UL	0.1 UL
2,2'-Oxybis(1-chloropropane)	0.1 UL	0.1 UL
2,3,4,6-Tetrachlorophenol	0.5 UL	0.5 UL
2,4,5-Trichlorophenol	0.5 UL	0.5 UL
2,4,6-Trichlorophenol	0.5 UL	0.5 UL
2,4-Dichlorophenol	0.25 UL	0.25 UL
2,4-Dimethylphenol	0.5 UL	0.5 UL
2,4-Dinitrophenol	5 UL	5 UL
2,4-Dinitrotoluene	0.1 UL	0.1 UL
2,6-Dinitrotoluene	0.25 UL	0.25 UL
2-Chloronaphthalene	0.1 UL	0.1 UL
2-Chlorophenol	0.1 UL	0.1 UL
2-Methylnaphthalene	0.1 UL	0.1 UL
2-Methylphenol	0.1 UL	0.1 UL
2-Nitroaniline	0.5 UL	0.5 UL
2-Nitrophenol	0.25 UL	0.25 UL
3,3'-Dichlorobenzidine	10 UL	10 UL
3-Nitroaniline	0.5 UL	0.5 UL
4,6-Dinitro-2-methylphenol	1 UL	1 UL
4-Bromophenyl-phenylether	0.1 UL	0.1 UL
4-Chloro-3-methylphenol	0.5 UL	0.5 UL
4-Chloroaniline	0.5 UL	0.5 UL
4-Chlorophenyl-phenylether	0.05 UL	0.05 UL
4-Methylphenol	0.16 L	0.16 L
4-Nitroaniline	0.5 UL	0.5 UL
4-Nitrophenol	2 UL	2 UL
Acenaphthene	0.05 UL	0.05 UL
Acenaphthylene	0.05 UL	0.05 UL
Acetophenone	0.15 L	0.15 L
Anthracene	0.05 UL	0.05 UL
Atrazine	0.1 UL	0.1 UL
Benzaldehyde	0.25 UL	0.25 UL
Benzo(a)anthracene	0.022 UL	0.022 UL
Benzo(a)pyrene	0.022 UL	0.022 UL
Benzo(b)fluoranthene	0.022 UL	0.022 UL
Benzo(g,h,i)perylene	0.1 UL	0.1 UL
Benzo(k)fluoranthene	0.022 UL	0.022 UL
bis(2-Chloroethoxy)methane	0.05 UL	0.05 UL
bis(2-Chloroethyl)ether	0.1 UL	0.1 UL
bis(2-Ethylhexyl)phthalate	0.5 UL	0.5 UL
Butylbenzylphthalate	0.5 UL	0.5 UL
Caprolactam	1 UL	1 UL
Carbazole	0.5 UL	0.5 UL

TABLE D.3-2

Site 4 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S04-DP03	CBD-S04-DP03
Sample ID	CBD-S04-GW03-1012	CBD-S04-GW03-1012
Sample Date	10/19/12	10/19/12
Chrysene	0.1 UL	0.1 UL
Dibenz(a,h)anthracene	0.022 UL	0.022 UL
Dibenzofuran	0.031 L	0.031 L
Diethylphthalate	0.082 B	0.082 B
Dimethyl phthalate	0.25 UL	0.25 UL
Di-n-butylphthalate	0.5 UL	0.5 UL
Di-n-octylphthalate	0.5 UL	0.5 UL
Fluoranthene	0.052 L	0.052 L
Fluorene	0.05 UL	0.05 UL
Hexachlorobenzene	0.1 UL	0.1 UL
Hexachlorobutadiene	0.05 UL	0.05 UL
Hexachlorocyclopentadiene	0.1 UL	0.1 UL
Hexachloroethane	0.1 UL	0.1 UL
Indeno(1,2,3-cd)pyrene	0.022 UL	0.022 UL
Isophorone	0.1 UL	0.1 UL
Naphthalene	0.044 B	0.044 B
n-Nitroso-di-n-propylamine	0.1 UL	0.1 UL
n-Nitrosodiphenylamine	0.1 UL	0.1 UL
Nitrobenzene	0.25 UL	0.25 UL
Pentachlorophenol	0.5 UL	0.5 UL
Phenanthrene	0.12 B	0.12 B
Phenol	0.16 L	0.16 L
Pyrene	0.031 L	0.031 L
Pesticide/Polychlorinated Biphenyls (UG/L)		
Aroclor-1016	0.08 U	0.08 U
Aroclor-1221	0.08 U	0.08 U
Aroclor-1232	0.08 U	0.08 U
Aroclor-1242	0.08 U	0.08 U
Aroclor-1248	0.08 U	0.08 U
Aroclor-1254	0.08 U	0.08 U
Aroclor-1260	0.08 U	0.08 U
Aroclor-1262	0.08 U	0.08 U
Aroclor-1268	0.08 U	0.08 U
Total Metals (UG/L)		
Aluminum	9,900	9,900
Antimony	0.5 U	0.5 U
Arsenic	17	17
Barium	130	130
Beryllium	0.84 J	0.84 J
Cadmium	0.68	0.68
Calcium	9,500	9,500
Chromium	92	92
Cobalt	12	12
Copper	8.7	8.7
Cyanide	4 U	4 U
Iron	23,000	23,000
Lead	18	18
Magnesium	6,900	6,900

TABLE D.3-2

Site 4 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S04-DP03	CBD-S04-DP03
Sample ID	CBD-S04-GW03-1012	CBD-S04-GW03-1012
Sample Date	10/19/12	10/19/12
Manganese	220	220
Mercury	0.1 U	0.1 U
Nickel	27	27
Potassium	4,600	4,600
Selenium	2.5 B	2.5 B
Silver	0.061 J	0.061 J
Sodium	8,700	8,700
Thallium	1.5	1.5
Vanadium	43	43
Zinc	99	99
Dissolved Metals (UG/L)		
Aluminum, Dissolved	50 U	50 U
Antimony, Dissolved	0.7 B	0.7 B
Arsenic, Dissolved	0.19 J	0.19 J
Barium, Dissolved	46	46
Beryllium, Dissolved	0.4 U	0.4 U
Cadmium, Dissolved	0.69	0.69
Calcium, Dissolved	8,400	8,400
Chromium (hexavalent), Dissolved	NA	NA
Chromium, Dissolved	0.79 J	0.79 J
Cobalt, Dissolved	7.4	7.4
Copper, Dissolved	1.2 B	1.2 B
Iron, Dissolved	190	190
Lead, Dissolved	0.5 U	0.5 U
Magnesium, Dissolved	4,000	4,000
Manganese, Dissolved	230	230
Mercury, Dissolved	0.1 U	0.1 U
Nickel, Dissolved	16	16
Potassium, Dissolved	2,100	2,100
Selenium, Dissolved	1 U	1 U
Silver, Dissolved	0.1 U	0.1 U
Sodium, Dissolved	9,400	9,400
Thallium, Dissolved	0.19 J	0.19 J
Vanadium, Dissolved	0.2 U	0.2 U
Zinc, Dissolved	57	57

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

UG/L - Micrograms per liter

TABLE D.4-1
Site 5 Validated Raw Analytical Data - Soil
Base-Wide Site Inspection Report
NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S05-DP01				CBD-S05-DP02		CBD-S05-DP03		CBD-S05-DP04		CBD-S05-DP05		CBD-S05-SO06
Sample ID	CBD-S05-SS01-1012	CBD-S05-SS01P-1012	CBD-S05-SB01-2022	CBD-S05-SB01P-2022	CBD-S05-SS02-1012	CBD-S05-SB02-2022	CBD-S05-SS03-1012	CBD-S05-SB03-1820	CBD-S05-SS04-1012	CBD-S05-SB04-2022	CBD-S05-SS05-1012	CBD-S05-SB05-2022	CBD-S05-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/19/12	10/19/12	10/18/12	10/18/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	20 - 22	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5
Chemical Name													
Volatile Organic Compounds (UG/KG)													
1,1,1-Trichloroethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,1,2,2-Tetrachloroethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,1,2-Trichloroethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,1-Dichloroethane	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	29 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
1,1-Dichloroethene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,2,3-Trichlorobenzene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,2,4-Trichlorobenzene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,2-Dibromo-3-chloropropane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,2-Dibromoethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,2-Dichlorobenzene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,2-Dichloroethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,2-Dichloropropane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
1,3-Dichlorobenzene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	58 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
1,4-Dichlorobenzene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	58 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
2-Butanone	5.4 B	0.44 U	0.6 U	0.52 U	9.9 B	0.5 U	4.4 B	210 J	2.9 B	1.9 B	4.7 B	0.52 U	6.9 B
2-Hexanone	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
4-Methyl-2-pentanone	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Acetone	98	20	6 U	5.2 U	400 J	16	160	430 J	110	19	140	28	160
Benzene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.2 J	0.67 U	0.52 U	0.32 J
Bromochloromethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Bromodichloromethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Bromoform	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	58 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
Bromomethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Carbon disulfide	0.38 B	0.37 B	0.51 B	0.35 B	0.42 B	0.44 B	0.7 B	58 U	0.41 B	1.5 B	0.45 B	0.38 B	0.59 B
Carbon tetrachloride	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	58 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
Chlorobenzene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	29 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
Chloroethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Chloroform	0.14 B	0.12 B	0.3 U	0.18 B	0.26 U	0.25 U	0.19 B	29 U	0.27 U	0.29 B	0.25 B	0.26 U	0.32 U
Chloromethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	24 B	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
cis-1,2-Dichloroethene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	58 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
cis-1,3-Dichloropropene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	29 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
Cyclohexane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Dibromochloromethane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Dichlorodifluoromethane (Freon-12)	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Ethylbenzene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	310	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Isopropylbenzene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	2,600	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
m- and p-Xylene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	390	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Methyl acetate	1.7 B	1 B	1.9 B	1 B	NA	1.6 B	1.8 B	1,300	2.9 B	2 J	31	2.4 B	2.8 B
Methylcyclohexane	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	160 J	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Methylene chloride	0.47 U	0.44 U	0.6 U	0.52 U	1.4 B	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	2.9 B	0.64 U
Methyl-tert-butyl ether (MTBE)	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
o-Xylene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	650	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
Styrene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	29 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
Tetrachloroethene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	58 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Toluene	0.78 J	0.31 J	0.6 U	0.52 U	1.3 J	0.5 U	0.24 J	29 U	0.71 J	0.75 J	1.8 J	0.52 U	0.46 J
trans-1,2-Dichloroethene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	58 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
trans-1,3-Dichloropropene	0.47 U	0.44 U	0.6 U	0.52 U	0.52 U	0.5 U	0.61 U	29 U	0.54 U	0.51 U	0.67 U	0.52 U	0.64 U
Trichloroethene	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	29 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
Trichlorofluoromethane (Freon-11)	0.23 U	0.22 U	0.3 U	0.26 U	0.26 J	0.25 U	0.3 U	58 U	0.27 U	0.25 U	0.33 U	0.43 J	0.32 U
Vinyl chloride	0.23 U	0.22 U	0.3 U	0.26 U	0.26 U	0.25 U	0.3 U	29 U	0.27 U	0.25 U	0.33 U	0.26 U	0.32 U
Semivolatile Organic Compounds (UG/KG)													
1,1-Biphenyl	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	45	18 U	20 U	25 U	20 U	21 U
1,2,4,5-Tetrachlorobenzene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
2,2'-Oxybis(1-chloropropane)	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
2,3,4,6-Tetrachlorophenol	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
2,4,5-Trichlorophenol	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
2,4,6-Trichlorophenol	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U

TABLE D.4-1
Site 5 Validated Raw Analytical Data - Soil
Base-Wide Site Inspection Report
NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S05-DP01				CBD-S05-DP02		CBD-S05-DP03		CBD-S05-DP04		CBD-S05-DP05		CBD-S05-SO06
Sample ID	CBD-S05-SS01-1012	CBD-S05-SS01P-1012	CBD-S05-SB01-2022	CBD-S05-SB01P-2022	CBD-S05-SS02-1012	CBD-S05-SB02-2022	CBD-S05-SS03-1012	CBD-S05-SB03-1820	CBD-S05-SS04-1012	CBD-S05-SB04-2022	CBD-S05-SS05-1012	CBD-S05-SB05-2022	CBD-S05-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/19/12	10/19/12	10/18/12	10/18/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	20 - 22	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5
Chemical Name													
2,4-Dichlorophenol	3.5 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.8 U	3.6 U	3.9 U	4.9 U	4 U	4.2 U
2,4-Dimethylphenol	36 U	34 U	40 U	39 U	35 U	39 U	2,000 U	39 U	36 U	39 U	49 U	40 U	43 U
2,4-Dinitrophenol	180 U	170 U	200 U	200 U	180 U	200 U	10,000 U	190 U	180 U	200 U	250 U	200 U	210 U
2,4-Dinitrotoluene	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
2,6-Dinitrotoluene	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
2-Chloronaphthalene	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
2-Chlorophenol	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
2-Methylnaphthalene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	330 J	720	1.8 U	2 U	2.5 U	2 U	13 J
2-Methylphenol	7.1 U	6.8 U	7.9 U	7.8 U	6.9 U	7.8 U	400 U	7.7 U	7.2 U	7.8 U	9.7 U	7.9 U	8.5 U
2-Nitroaniline	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
2-Nitrophenol	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
3,3'-Dichlorobenzidine	360 U	340 U	400 U	390 U	350 U	390 U	20,000 U	390 U	360 U	390 U	490 U	400 U	430 U
3-Nitroaniline	36 U	34 U	40 U	39 U	35 U	39 U	2,000 U	39 U	36 U	39 U	49 U	40 U	43 U
4,6-Dinitro-2-methylphenol	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
4-Bromophenyl-phenylether	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
4-Chloro-3-methylphenol	7.1 U	6.8 U	7.9 U	7.8 U	6.9 U	7.8 U	400 U	7.7 U	7.2 U	7.8 U	9.7 U	7.9 U	8.5 U
4-Chloroaniline	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
4-Chlorophenyl-phenylether	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
4-Methylphenol	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
4-Nitroaniline	36 U	34 U	40 U	39 U	35 U	39 U	2,000 U	39 U	36 U	39 U	49 U	40 U	43 U
4-Nitrophenol	36 U	34 U	40 U	39 U	35 U	39 U	2,000 U	39 U	36 U	39 U	49 U	40 U	43 U
Acenaphthene	1.7 J	1.7 U	2 U	2 U	1.8 U	2 U	2,600	93	1.8 U	2 U	2.5 U	2 U	70
Acenaphthylene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	1.3 J
Acetophenone	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
Anthracene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	6,400	2.4 J	1.8 U	2 U	2.5 U	2 U	120
Atrazine	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
Benzaldehyde	18 R	17 R	20 R	20 R	18 R	20 R	1,000 R	19 R	18 R	20 R	25 R	20 R	21 R
Benzo(a)anthracene	2.8 J	5.2 J	2 U	2 U	1.8 U	2 U	30,000	5.6 J	4.8 J	2 U	6.4 J	2 U	290
Benzo(a)pyrene	3.6 U	5.2 J	4 U	0.79 U	3.5 U	0.79 U	3,700	7.8 U	18	0.79 U	250	0.8 U	200
Benzo(b)fluoranthene	4.5 J	6.6 J	4 U	3.9 U	3.5 U	3.9 U	32,000	10 J	6.6 J	3.9 U	12 J	4 U	370
Benzo(g,h,i)perylene	2.4 J	3.1 J	2 U	2 U	1.8 U	2 U	13,000	13 J	2.9 J	2 U	5.4 J	2 U	110
Benzo(k)fluoranthene	2.4 J	3.8 J	4 U	3.9 U	3.5 U	3.9 U	11,000	4 J	3.3 J	3.9 U	6.4 J	4 U	150
bis(2-Chloroethoxy)methane	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
bis(2-Chloroethyl)ether	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
bis(2-Ethylhexyl)phthalate	6.6 B	6.3 B	5.1 B	5.9 B	18 U	6.3 B	1,000 U	10 B	16 B	7.6 B	16 B	5.6 B	26 B
Butylbenzylphthalate	3.6 UJ	61 J	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
Caprolactam	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
Carbazole	36 U	34 U	40 U	39 U	35 U	39 U	3,100 J	39 U	36 U	39 U	49 U	40 U	64 J
Chrysene	2.8 J	4.9 J	2 U	2 U	1.8 U	2 U	26,000	5.2 J	5.1 J	2 U	6.9 J	2 U	260
Dibenz(a,h)anthracene	3.6 U	3.4 U	4 U	0.79 U	3.5 U	0.79 U	420 J	7.8 U	3.6 U	0.79 U	25	0.8 U	26
Dibenzofuran	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	1,200	59	1.8 U	2 U	2.5 U	2 U	39
Diethylphthalate	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
Dimethyl phthalate	3.6 U	3.4 U	2.3 J	3.9 U	3.5 U	3.9 U	200 U	3.9 U	2.6 J	3.9 U	4.9 U	4 U	4.3 U
Di-n-butylphthalate	18 U	17 U	20 U	20 U	18 U	20 U	1,000 U	19 U	18 U	20 U	25 U	20 U	21 U
Di-n-octylphthalate	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
Fluoranthene	4.2 J	7.3 J	2 U	2 U	1 J	2 U	45,000	4.4 J	6.3 J	2 U	6.9 J	2 U	430
Fluorene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	2,100	25	1.8 U	2 U	2.5 U	2 U	60
Hexachlorobenzene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
Hexachlorobutadiene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
Hexachlorocyclopentadiene	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
Hexachloroethane	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
Indeno(1,2,3-cd)pyrene	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	13,000	6.8 J	3.6 U	3.9 U	4.9 J	4 U	110
Isophorone	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
Naphthalene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	1,500	82	1.8 U	2 U	2.5 U	2 U	27
n-Nitroso-di-n-propylamine	3.6 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.9 U	3.6 U	3.9 U	4.9 U	4 U	4.3 U
n-Nitrosodiphenylamine	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
Nitrobenzene	1.8 U	1.7 U	2 U	2 U	1.8 U	2 U	100 U	1.9 U	1.8 U	2 U	2.5 U	2 U	2.1 U
Pentachlorophenol	36 U	34 U	40 U	39 U	35 U	39 U	2,000 U	39 U	36 U	39 U	49 U	40 U	43 U
Phenanthrene	2.8 J	4.5 J	1.2 J	2 U	1.8 U	2 U	27,000	13 J	4 J	2 U	3.5 J	2 U	510
Phenol	3.5 U	3.4 U	4 U	3.9 U	3.5 U	3.9 U	200 U	3.8 U	3.6 U	3.9 U	4.9 U	4 U	4.2 U

TABLE D.4-1
Site 5 Validated Raw Analytical Data - Soil
Base-Wide Site Inspection Report
NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S05-DP01				CBD-S05-DP02		CBD-S05-DP03		CBD-S05-DP04		CBD-S05-DP05		CBD-S05-SO06
Sample ID	CBD-S05-SS01-1012	CBD-S05-SS01P-1012	CBD-S05-SB01-2022	CBD-S05-SB01P-2022	CBD-S05-SS02-1012	CBD-S05-SB02-2022	CBD-S05-SS03-1012	CBD-S05-SB03-1820	CBD-S05-SS04-1012	CBD-S05-SB04-2022	CBD-S05-SS05-1012	CBD-S05-SB05-2022	CBD-S05-SS06-1012
Sample Date	10/18/12	10/18/12	10/18/12	10/18/12	10/19/12	10/19/12	10/18/12	10/18/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	20 - 22	20 - 22	0 - 0.5	20 - 22	0 - 0.5	18 - 20	0 - 0.5	20 - 22	0 - 0.5	20 - 22	0 - 0.5
Chemical Name													
Pyrene	4.9 J	7.3 J	4 U	3.9 U	3.5 U	3.9 U	48,000	13 J	7.4 J	3.9 U	10 J	4 U	550
Pesticide/Polychlorinated Biphenyls (UG/KG)													
Aroclor-1016	14 U	13 U	16 U	15 U	14 U	15 U	16 U	15 U	14 U	15 U	19 U	16 U	17 U
Aroclor-1221	14 U	13 U	16 U	15 U	14 U	15 U	16 U	15 U	14 U	15 U	19 U	16 U	17 U
Aroclor-1232	14 U	13 U	16 U	15 U	14 U	15 U	16 U	15 U	14 U	15 U	19 U	16 U	17 U
Aroclor-1242	14 U	13 U	16 U	15 U	14 U	15 U	16 U	15 U	14 U	15 U	19 U	16 U	17 U
Aroclor-1248	14 U	13 U	16 U	15 U	14 U	15 U	16 U	15 U	14 U	15 U	19 U	16 U	17 U
Aroclor-1254	9.1 J	13 U	16 U	15 U	14 U	15 U	46	15 U	14 U	15 U	19 U	16 U	32
Aroclor-1260	14 U	8.2 J	16 U	15 U	14 U	15 U	80	15 U	5.6 J	15 U	19 U	16 U	37
Aroclor-1262	14 U	13 U	16 U	15 U	14 U	15 U	16 U	15 U	14 U	15 U	19 U	16 U	17 U
Aroclor-1268	14 U	13 U	16 U	15 U	14 U	15 U	16 U	15 U	14 U	15 U	19 U	16 U	17 U
Total Metals (MG/KG)													
Aluminum	5,600 J	4,400 J	2,500	2,300	2,700	4,400	7,400	1,800	6,300	7,000	2,300	1,800	6,700
Antimony	0.16	0.13 B	0.13 B	0.16	0.09 J	0.13	2.4	0.33	0.81	0.32	0.066 J	0.18	2
Arsenic	2.3	1.6	2.6	2.6	0.91	2.6	5.1	3.7	2.8	4.4	0.94	3.4	3.6
Barium	20	16	6.7	7.1	9.7	8.7	39	5.8	25	9.4	6	4.3	26
Beryllium	0.33	0.23	2.1	1.8	0.19	2.7	0.41	2.7	0.37	3.6	0.15	2.7	1.4
Cadmium	0.067	0.093	0.26	0.21	0.053	0.26	0.44	0.19	0.2	0.46	0.033 J	0.3	0.39
Calcium	140 J	460 J	360	300	250	340	2,500	410	1,100	88	25 J	450	1,300
Chromium (hexavalent)	0.17 J	0.21 U	0.25 U	0.27 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	9.9	6.2	8.4	8.2	4.8	9	18	7.6	17	7.4	4.8	8.2	14
Cobalt	2.1	1.1	2.9	2.6	0.83	3.9	2.1	9.8	1.7	110	0.7	5.4	6.9
Copper	5	5	1.1	1.2	1.9	1.3	230	5.6	17	1.5	2	1	72
Cyanide	0.054 U	0.036 J	0.06 U	0.059 U	0.036 J	0.059 U	0.065 J	0.058 U	0.032 J	0.059 U	0.034 J	0.06 U	0.064 U
Iron	8,000 J	6,100 J	3,800	3,400	3,200	4,500	14,000	4,300	10,000 B	5,100	2,600	4,300	12,000
Lead	8.7	8	2.1	2	4.1	1.8	140	3.4	25	1.6	4.2	1.7	60
Magnesium	550	450	740	660	330	860	1,300	630	1,000	560	220	660	950
Manganese	39	42	13 J	8.5 J	26	12	65	46	47	290	13	21	100
Mercury	0.017 U	0.011 J	0.017 U	0.016 U	0.0066 J	0.016 U	0.11	0.017 U	0.059	0.017 U	0.017 U	0.017 U	0.078
Nickel	3.5	3	4.8	4.4	1.8	11	10	13	4.6	32	1.4	20	15
Potassium	430	370	480	420	250	530	1,000	410	760	380	220	450	800
Selenium	0.26	0.16 B	0.3	0.4	0.17	0.53	0.38	0.26	0.33	0.86	0.1	0.071 J	0.47
Silver	0.052	0.15	0.027 J	0.028 J	0.17	0.028 J	0.3	0.29	0.49	0.024 J	0.076	0.023 J	0.68
Sodium	11 B	9 B	31 J	26 J	9.4 B	55 B	28 B	12 B	22 J	44 B	16 B	14 B	28 B
Thallium	0.11	0.076	0.21	0.19	0.052	0.18	0.13	0.15	0.12	0.31	0.045 J	0.14	0.11
Vanadium	15	9.2	4.6	5	6.3	7.8	40	4.8	18	11	6.5	4.6	35
Zinc	19 B	18 B	68	78	12 B	80 B	200 B	110 B	52 B	130 B	5.9	57 B	96 B
Wet Chemistry													
pH (ph)	5.5	NA	NA	NA	5.7	NA	6.2	NA	5.6	NA	4.9	NA	5.6
Total organic carbon (TOC) (mg/kg)	2,700	NA	NA	NA	5,300	NA	14,000	NA	7,200	NA	5,000	NA	16,000

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP01				CBD-S07-DP02		CBD-S07-DP03		CBD-S07-DP04	
Sample ID	CBD-S07-SS01-1012	CBD-S07-SS01P-1012	CBD-S07-SB01-0608	CBD-S07-SB01P-0608	CBD-S07-SS02-1012	CBD-S07-SB02-0507	CBD-S07-SS03-1012	CBD-S07-SB03-0608	CBD-S07-SS04-1012	CBD-S07-SB04-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	06 - 08	06 - 08	0 - 0.5	05 - 07	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Chemical Name										
Volatile Organic Compounds (UG/KG)										
1,1,1-Trichloroethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,1,2,2-Tetrachloroethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,1,2-Trichloroethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,1-Dichloroethane	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
1,1-Dichloroethene	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,2,3-Trichlorobenzene	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,2,4-Trichlorobenzene	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,2-Dibromo-3-chloropropane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,2-Dibromoethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,2-Dichlorobenzene	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,2-Dichloroethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,2-Dichloropropane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
1,3-Dichlorobenzene	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
1,4-Dichlorobenzene	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
2-Butanone	1.2 J	0.58 U	0.49 UJ	0.53 U	1 J	2.6 J	1.1 J	2.6 J	6.5 J	0.52 U
2-Hexanone	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
4-Methyl-2-pentanone	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Acetone	48 J	17 J	4.9 UJ	5.3 U	35 J	4.9 UJ	12 J	5.2 U	190 J	5.2 UJ
Benzene	0.51 U	0.58 U	170 J	0.32 J	0.43 U	11	0.49 U	21	0.7 U	0.52 U
Bromochloromethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Bromodichloromethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Bromoform	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
Bromomethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Carbon disulfide	0.41 B	0.31 B	15 B	1 B	0.46 B	0.99 B	2.3 B	1.8 B	0.32 B	0.21 B
Carbon tetrachloride	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
Chlorobenzene	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
Chloroethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Chloroform	0.15 B	0.17 B	0.24 UJ	0.24 B	0.15 B	0.25 U	0.14 B	0.26 U	0.25 B	0.23 B
Chloromethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
cis-1,2-Dichloroethene	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
cis-1,3-Dichloropropene	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
Cyclohexane	0.51 U	0.58 U	570 J	2.5 J	0.43 U	0.49 U	0.49 U	430	0.7 U	0.52 U
Dibromochloromethane	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Dichlorodifluoromethane (Freon-12)	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Ethylbenzene	0.51 U	0.58 U	18 J	0.57 J	0.43 U	130	0.49 U	520	0.7 U	0.52 U
Isopropylbenzene	0.25 U	0.29 U	160 J	1.6	0.21 U	170	0.25 U	410	0.35 U	0.26 U
m- and p-Xylene	0.51 U	0.58 U	73 J	2.2	0.43 U	280	0.4 J	2,500	0.7 U	0.52 U
Methyl acetate	2.6 B	1.2 B	20 J	0.82 B	1.1 B	2.4 B	2.2 B	9.5	5.1 B	1 B
Methylcyclohexane	0.51 U	0.58 U	950 J	5 J	0.43 U	1,200	0.49 U	850	0.7 U	0.52 U
Methylene chloride	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Methyl-tert-butyl ether (MTBE)	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
o-Xylene	0.25 U	0.29 U	41 J	1.9	0.21 U	82	0.15 J	660	0.35 U	0.26 U

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP01				CBD-S07-DP02		CBD-S07-DP03		CBD-S07-DP04	
Sample ID	CBD-S07-SS01-1012	CBD-S07-SS01P-1012	CBD-S07-SB01-0608	CBD-S07-SB01P-0608	CBD-S07-SS02-1012	CBD-S07-SB02-0507	CBD-S07-SS03-1012	CBD-S07-SB03-0608	CBD-S07-SS04-1012	CBD-S07-SB04-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	06 - 08	06 - 08	0 - 0.5	05 - 07	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Styrene	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
Tetrachloroethene	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Toluene	2.9	0.58 U	NA	0.47 B	0.43 U	4.3	0.43 B	40	0.49 B	0.52 U
trans-1,2-Dichloroethene	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
trans-1,3-Dichloropropene	0.51 U	0.58 U	0.49 UJ	0.53 U	0.43 U	0.49 U	0.49 U	0.52 U	0.7 U	0.52 U
Trichloroethene	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
Trichlorofluoromethane (Freon-11)	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
Vinyl chloride	0.25 U	0.29 U	0.24 UJ	0.27 U	0.21 U	0.25 U	0.25 U	0.26 U	0.35 U	0.26 U
Semivolatile Organic Compounds (UG/KG)										
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP01				CBD-S07-DP02		CBD-S07-DP03		CBD-S07-DP04	
Sample ID	CBD-S07-SS01-1012	CBD-S07-SS01P-1012	CBD-S07-SB01-0608	CBD-S07-SB01P-0608	CBD-S07-SS02-1012	CBD-S07-SB02-0507	CBD-S07-SS03-1012	CBD-S07-SB03-0608	CBD-S07-SS04-1012	CBD-S07-SB04-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	06 - 08	06 - 08	0 - 0.5	05 - 07	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)										
Aroclor-1016	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Aroclor-1221	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Aroclor-1232	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Aroclor-1242	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Aroclor-1248	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Aroclor-1254	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Aroclor-1260	830	940	85	16 U	350	16 U	5.4 J	17 U	14 U	14 U
Aroclor-1262	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Aroclor-1268	60 U	76 U	15 U	16 U	29 U	16 U	15 U	17 U	14 U	14 U
Total Metals (MG/KG)										
Aluminum	6,600	5,600	6,300	6,800	4,800	4,100	6,600	6,200	2,600	2,600
Antimony	0.17 J	0.13	0.13	0.14	0.23	0.074 J	0.13	0.12	0.077 J	0.076 J

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP01				CBD-S07-DP02		CBD-S07-DP03		CBD-S07-DP04	
Sample ID	CBD-S07-SS01-1012	CBD-S07-SS01P-1012	CBD-S07-SB01-0608	CBD-S07-SB01P-0608	CBD-S07-SS02-1012	CBD-S07-SB02-0507	CBD-S07-SS03-1012	CBD-S07-SB03-0608	CBD-S07-SS04-1012	CBD-S07-SB04-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	06 - 08	06 - 08	0 - 0.5	05 - 07	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Arsenic	1.6	1.6	3.1	3.4	2	1.5	2.3	0.31 B	1.3	1.7
Barium	22 J	16 J	16	16	20	12	23	19	6.4	7.9
Beryllium	0.36	0.29	0.77	0.85	0.3	0.48	0.41	0.41	0.15	0.2
Cadmium	0.11	0.084	0.65	0.71	0.1	0.26	0.15	0.28	0.024 J	0.011 J
Calcium	1,200	1,100	920	1,000	1,100	430	980	1,000	170	180
Chromium (hexavalent)	0.23 J	0.3 J	0.13 L	0.31 J	NA	NA	NA	NA	NA	NA
Chromium	21	21	28	27	11	12	17	2.4	5	4.5
Cobalt	2.2	2	4.6	5.2	1.9	1.7	2.6	0.54	0.94	0.77
Copper	4.4	3.4	5.2	4.7	3.6	2.3	3.3	1.8	2.2	2.1
Cyanide	0.029 J	0.058 U	0.059 U	0.062 U	0.056 U	0.063 U	0.057 U	0.067 U	0.053 U	0.049 U
Iron	6,200	5,900	12,000	12,000	5,600	5,100	8,200	11,000	3,900	4,500
Lead	10	7.7	8.8 L	7.4	8.5	3.8	9.6	2.6	3.4	2.7
Magnesium	1,500 K	1,600	2,200 K	2,100	740	780	1,300	1,900	210	260
Manganese	33	30	36	31	41	18	42	32	16	17
Mercury	0.017 J	0.011 J	0.0096 J	0.012 J	0.016 J	0.017 U	0.014 J	0.017 J	0.017 U	0.0067 J
Nickel	13 L	12 J	20 K	13	6.4	3.3	12	0.86	1.2	1.2
Potassium	650	680	1,100	1,200	420	570	560	1,200	240	280
Selenium	0.26 B	0.18 B	0.41 B	0.39 B	0.11 B	0.09 B	0.32 B	0.1 B	0.068 B	0.078 B
Silver	0.048 J	0.043 J	0.043 J	0.039 J	0.036 J	0.026 J	0.033 J	0.01 U	0.022 J	0.02 J
Sodium	30 B	23 B	130	150	6.6 B	50 B	8 B	75	25 U	25 U
Thallium	0.2	0.18	0.43	0.47	0.17	0.35	0.19	0.1	0.042 J	0.048 J
Vanadium	14	12	16 L	16	9.5	9.3	11	1.3	7.1	6.5
Zinc	27	21	180	190	24	43	31	23	5.3	6.3 B
Wet Chemistry										
pH (ph)	6.8	NA	NA	NA	7.8	NA	7.9	NA	6.2	NA
Total organic carbon (TOC) (mg/kg)	6,500	NA	NA	NA	4,500	NA	2,300	NA	760 J	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP05		CBD-S07-DP06		CBD-S07-DP07		CBD-S07-DP08		CBD-S07-DP09	
Sample ID	CBD-S07-SS05-1012	CBD-S07-SB05-0608	CBD-S07-SS06-1012	CBD-S07-SB06-0608	CBD-S07-SS07-1012	CBD-S07-SB07-0608	CBD-S07-SS08-1012	CBD-S07-SB08-0608	CBD-S07-SS09-1012	CBD-S07-SB09-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Chemical Name										
Volatile Organic Compounds (UG/KG)										
1,1,1-Trichloroethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,1,2,2-Tetrachloroethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,1,2-Trichloroethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,1-Dichloroethane	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
1,1-Dichloroethene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,2,3-Trichlorobenzene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,2,4-Trichlorobenzene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,2-Dibromo-3-chloropropane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,2-Dibromoethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,2-Dichlorobenzene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,2-Dichloroethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,2-Dichloropropane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
1,3-Dichlorobenzene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
1,4-Dichlorobenzene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
2-Butanone	7.8 J	0.42 U	6.8 J	0.47 U	5.1 J	0.57 U	8.7 J	1.1 J	1.4 J	4.1 J
2-Hexanone	0.55 J	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
4-Methyl-2-pentanone	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Acetone	250 J	4.2 UJ	97 J	4.7 UJ	88 J	24 J	150 J	42 J	48 J	88 J
Benzene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Bromochloromethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Bromodichloromethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Bromoform	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Bromomethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.64 J
Carbon disulfide	0.23 B	0.18 B	0.27 B	0.47 U	0.26 B	0.2 B	1.5 B	0.65 U	0.24 B	0.31 B
Carbon tetrachloride	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Chlorobenzene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Chloroethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Chloroform	0.2 B	0.14 B	0.18 B	0.19 B	0.23 B	0.18 B	0.25 B	0.28 B	0.15 B	0.3 B
Chloromethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
cis-1,2-Dichloroethene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
cis-1,3-Dichloropropene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Cyclohexane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Dibromochloromethane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Dichlorodifluoromethane (Freon-12)	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Ethylbenzene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Isopropylbenzene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
m- and p-Xylene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Methyl acetate	8.1	0.93 B	3.1 B	1.2 B	1.3 B	1.4 B	2.5 B	2 B	5.8 B	2.3 B
Methylcyclohexane	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Methylene chloride	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Methyl-tert-butyl ether (MTBE)	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
o-Xylene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP05		CBD-S07-DP06		CBD-S07-DP07		CBD-S07-DP08		CBD-S07-DP09	
Sample ID	CBD-S07-SS05-1012	CBD-S07-SB05-0608	CBD-S07-SS06-1012	CBD-S07-SB06-0608	CBD-S07-SS07-1012	CBD-S07-SB07-0608	CBD-S07-SS08-1012	CBD-S07-SB08-0608	CBD-S07-SS09-1012	CBD-S07-SB09-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Styrene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Tetrachloroethene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Toluene	0.27 B	0.42 U	0.34 B	0.47 U	0.51 U	0.57 U	0.87 B	0.65 U	0.46 U	0.75 U
trans-1,2-Dichloroethene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
trans-1,3-Dichloropropene	0.47 U	0.42 U	0.47 U	0.47 U	0.51 U	0.57 U	0.57 U	0.65 U	0.46 U	0.75 U
Trichloroethene	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Trichlorofluoromethane (Freon-11)	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Vinyl chloride	0.23 U	0.21 U	0.24 U	0.24 U	0.25 U	0.28 U	0.29 U	0.32 U	0.23 U	0.37 U
Semivolatile Organic Compounds (UG/KG)										
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP05		CBD-S07-DP06		CBD-S07-DP07		CBD-S07-DP08		CBD-S07-DP09	
Sample ID	CBD-S07-SS05-1012	CBD-S07-SB05-0608	CBD-S07-SS06-1012	CBD-S07-SB06-0608	CBD-S07-SS07-1012	CBD-S07-SB07-0608	CBD-S07-SS08-1012	CBD-S07-SB08-0608	CBD-S07-SS09-1012	CBD-S07-SB09-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)										
Aroclor-1016	14 U	15 U	14 U	14 U	15 U	18 U	15 U	19 U	70 U	23 U
Aroclor-1221	14 U	15 U	14 U	14 U	15 U	18 U	15 U	19 U	70 U	23 U
Aroclor-1232	14 U	15 U	14 U	14 U	15 U	18 U	15 U	19 U	70 U	23 U
Aroclor-1242	14 U	15 U	14 U	14 U	15 U	18 U	15 U	19 U	70 U	23 U
Aroclor-1248	14 U	15 U	14 U	14 U	15 U	18 U	15 U	19 U	70 U	23 U
Aroclor-1254	14 U	15 U	14 U	14 U	50	18 U	50	19 U	70 U	23 U
Aroclor-1260	4.2 J	15 U	14 U	14 U	65	18 U	60	19 U	110	23 U
Aroclor-1262	14 U	15 U	14 U	14 U	15 U	18 U	15 U	19 U	70 U	23 U
Aroclor-1268	14 U	15 U	14 U	14 U	15 U	18 U	15 U	19 U	70 U	23 U
Total Metals (MG/KG)										
Aluminum	2,900	1,600	4,500	2,600	6,200	10,000	5,400	10,000	5,300	7,800
Antimony	0.11	0.063 J	0.12	0.11	0.4	0.19	0.33	0.21	0.31	0.18

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP05		CBD-S07-DP06		CBD-S07-DP07		CBD-S07-DP08		CBD-S07-DP09	
Sample ID	CBD-S07-SS05-1012	CBD-S07-SB05-0608	CBD-S07-SS06-1012	CBD-S07-SB06-0608	CBD-S07-SS07-1012	CBD-S07-SB07-0608	CBD-S07-SS08-1012	CBD-S07-SB08-0608	CBD-S07-SS09-1012	CBD-S07-SB09-0608
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12	10/22/12
Sample Depth (feet)	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08	0 - 0.5	06 - 08
Arsenic	1.4	1.3	2.1	2.7	3.5	3	2.7	3.2	2.5	5.5
Barium	6.8	6.5	19	8.3	33	26	24	27	24	20
Beryllium	0.18	0.13	0.33	0.21	0.45	0.44	0.36	0.65	0.4	0.35
Cadmium	0.025 J	0.0072 J	0.077	0.026 J	0.52	0.058	0.27	0.097	0.15	0.097
Calcium	150	120	360	180	16,000	2,000	1,200	1,600	1,700	680
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	5.1	3.8	7.1	6.1	21	37	15	21	13	41
Cobalt	1.1	0.35	1.8	1.3	2.6	1.8	2.2	1.9	2.1	3.8
Copper	2.7	1.5	3.1	2.1	9.9	3.3	6.7	3.4	4.9	3.5
Cyanide	0.053 U	0.056 U	0.027 J	0.053 U	0.32	0.069 U	0.21	0.072 U	0.068 J	0.065 J
Iron	4,300	3,300	5,900	5,200	15,000	18,000	9,000	20,000	8,800	21,000
Lead	3.8	2.2	7.1	3.3	62	6.9	64	7.6	25	6.5
Magnesium	230	160	430	310	4,300	2,500	960	2,500	1,200	2,400
Manganese	20	7.5	71	36	130	88	90	150	120	250
Mercury	0.0062 J	0.017 U	0.012 J	0.017 U	0.047 J	0.027 J	0.033 J	0.028 J	0.022 J	0.024 J
Nickel	1.3	0.66	3.6	1.1	19	5.3	18	6.4	11	4.5
Potassium	270	200	300	350	1,000	1,500	460	1,400	720	1,400
Selenium	0.15 B	0.13 B	0.22 B	0.17 B	0.34	0.41 B	0.28 B	0.4 B	0.24 B	0.4 B
Silver	0.019 J	0.015 J	0.039 J	0.023 J	0.065	0.044 J	0.054	0.04 J	0.036 J	0.06
Sodium	9.5 B	9.8 B	8.6 B	8.4 B	46 B	920	50 B	900	110	380
Thallium	0.046 J	0.027 J	0.082	0.15	0.14	0.2	0.16	0.26	0.15	0.29
Vanadium	7.3	5.1	9.8	7.2	78	17	78	9.9	51	14
Zinc	5.9	3.7	19	7.8	260	35	150	25 B	80	32
Wet Chemistry										
pH (ph)	6	NA	6.5	NA	7.1	NA	7.6	NA	7.3	NA
Total organic carbon (TOC) (mg/kg)	1,100	NA	4,200	NA	15,000	NA	9,900	NA	6,900	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP10		CBD-S07-DP11	CBD-S07-DP12	CBD-S07-DP13	CBD-S07-DP14	CBD-S07-DP15	CBD-S07-DP16	CBD-S07-DP17	CBD-S07-DP18	CBD-S07-DP19
Sample ID	CBD-S07-SB10-0204	CBD-S07-SB10P-0204	CBD-S07-SB11-0204	CBD-S07-SB12-0204	CBD-S07-SB13-0204	CBD-S07-SB14-0204	CBD-S07-SB15-0204	CBD-S07-SB16-0204	CBD-S07-SB17-0204	CBD-S07-SB18-0204	CBD-S07-SB19-0204
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04
Chemical Name											
Volatile Organic Compounds (UG/KG)											
1,1,1-Trichloroethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,1,2,2-Tetrachloroethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,1,2-Trichloroethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,1-Dichloroethane	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
1,1-Dichloroethene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,2,3-Trichlorobenzene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,2,4-Trichlorobenzene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,2-Dibromo-3-chloropropane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,2-Dibromoethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,2-Dichlorobenzene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,2-Dichloroethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,2-Dichloropropane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
1,3-Dichlorobenzene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
1,4-Dichlorobenzene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
2-Butanone	0.44 U	0.43 U	0.46 B	3.2 B	0.44 U	0.4 U	12 B	0.5 U	0.53 U	0.5 U	0.53 U
2-Hexanone	0.44 UJ	0.43 UJ	0.42 UJ	0.41 UJ	0.44 UJ	0.4 UJ	0.69 J	0.5 U	0.53 U	0.5 U	0.53 U
4-Methyl-2-pentanone	0.44 UJ	0.43 UJ	0.42 UJ	0.41 UJ	0.44 UJ	0.4 UJ	0.46 UJ	0.5 U	0.53 U	0.5 U	0.53 U
Acetone	40 B	5.8 B	25 B	44 B	28 B	4 U	81 J	5 U	5.3 U	5 U	5.3 UJ
Benzene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.2 J	0.5 U	0.53 U	0.5 U	0.53 U
Bromochloromethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Bromodichloromethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Bromoform	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Bromomethane	0.44 U	0.43 U	0.42 U	0.39 J	0.44 U	0.4 U	1.2 J	0.5 U	0.53 U	0.5 U	0.53 U
Carbon disulfide	0.4 B	0.42 B	0.68 B	0.45 B	0.43 B	0.51 B	0.41 B	0.38 B	0.39 B	0.42 B	0.25 J
Carbon tetrachloride	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Chlorobenzene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Chloroethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Chloroform	0.15 B	0.21 U	0.15 B	0.2 U	0.22 U	0.2 U	0.18 B	0.16 B	0.27 U	0.25 U	0.13 B
Chloromethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
cis-1,2-Dichloroethene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
cis-1,3-Dichloropropene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Cyclohexane	0.44 U	0.43 U	0.13 J	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Dibromochloromethane	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Dichlorodifluoromethane (Freon-12)	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Ethylbenzene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Isopropylbenzene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
m- and p-Xylene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Methyl acetate	1 B	0.83 B	0.93 B	0.73 B	0.87 B	0.85 B	0.95 B	1.2 B	1.5 B	1.2 B	1.6 B
Methylcyclohexane	0.44 U	0.15 J	0.28 J	0.41 U	0.44 U	0.4 U	0.46 U	0.21 J	0.53 U	0.5 U	0.53 U
Methylene chloride	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Methyl-tert-butyl ether (MTBE)	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
o-Xylene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP10		CBD-S07-DP11	CBD-S07-DP12	CBD-S07-DP13	CBD-S07-DP14	CBD-S07-DP15	CBD-S07-DP16	CBD-S07-DP17	CBD-S07-DP18	CBD-S07-DP19
Sample ID	CBD-S07-SB10-0204	CBD-S07-SB10P-0204	CBD-S07-SB11-0204	CBD-S07-SB12-0204	CBD-S07-SB13-0204	CBD-S07-SB14-0204	CBD-S07-SB15-0204	CBD-S07-SB16-0204	CBD-S07-SB17-0204	CBD-S07-SB18-0204	CBD-S07-SB19-0204
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04
Styrene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Tetrachloroethene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Toluene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
trans-1,2-Dichloroethene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
trans-1,3-Dichloropropene	0.44 U	0.43 U	0.42 U	0.41 U	0.44 U	0.4 U	0.46 U	0.5 U	0.53 U	0.5 U	0.53 U
Trichloroethene	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Trichlorofluoromethane (Freon-11)	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Vinyl chloride	0.22 U	0.21 U	0.21 U	0.2 U	0.22 U	0.2 U	0.23 U	0.25 U	0.27 U	0.25 U	0.26 U
Semivolatile Organic Compounds (UG/KG)											
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP10		CBD-S07-DP11	CBD-S07-DP12	CBD-S07-DP13	CBD-S07-DP14	CBD-S07-DP15	CBD-S07-DP16	CBD-S07-DP17	CBD-S07-DP18	CBD-S07-DP19
Sample ID	CBD-S07-SB10-0204	CBD-S07-SB10P-0204	CBD-S07-SB11-0204	CBD-S07-SB12-0204	CBD-S07-SB13-0204	CBD-S07-SB14-0204	CBD-S07-SB15-0204	CBD-S07-SB16-0204	CBD-S07-SB17-0204	CBD-S07-SB18-0204	CBD-S07-SB19-0204
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)											
Aroclor-1016	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1221	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1232	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1242	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1248	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1254	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1260	4.6 J	14 U	4.8 J	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1262	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Aroclor-1268	14 U	14 U	14 U	14 U	15 U	14 U	14 U	14 U	14 U	14 U	15 U
Total Metals (MG/KG)											
Aluminum	3,900	3,600	4,400	4,400	7,200	9,000	5,900	2,200	5,200	5,100	3,100
Antimony	0.082 J	0.058 J	0.06 J	0.086 J	0.16	0.14	0.19	0.062 J	0.19	0.17	0.086 J

TABLE D.5-1

Site 7 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S07-DP10		CBD-S07-DP11	CBD-S07-DP12	CBD-S07-DP13	CBD-S07-DP14	CBD-S07-DP15	CBD-S07-DP16	CBD-S07-DP17	CBD-S07-DP18	CBD-S07-DP19
Sample ID	CBD-S07-SB10-0204	CBD-S07-SB10P-0204	CBD-S07-SB11-0204	CBD-S07-SB12-0204	CBD-S07-SB13-0204	CBD-S07-SB14-0204	CBD-S07-SB15-0204	CBD-S07-SB16-0204	CBD-S07-SB17-0204	CBD-S07-SB18-0204	CBD-S07-SB19-0204
Sample Date	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/17/12	10/19/12	10/19/12	10/19/12	10/19/12
Sample Depth (feet)	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04	02 - 04
Arsenic	1.7	1.9	2.2	3.5	4	4.6	4.2	1	2.6	3.1	1.1
Barium	23	26	26	38	14	33	19	16	28	23	8.8
Beryllium	0.4	0.4	0.36	0.69	0.27	0.36	0.51	1.1	0.61	0.5	0.22
Cadmium	0.055	0.025 B	0.042 J	0.05	0.034 J	0.069	0.028 J	0.1	0.063	0.14	0.02 J
Calcium	410 J	280 J	4,300	540	580	700	950	1,900	3,700	1,400	3,400
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	4.5	4.8	4.8	5.9	13	13	8.2	8.2	7.8	9.5	8.7
Cobalt	1.9	2	1.7	3.3	2.1	2	2.8	0.53	3.5	2.2	0.67
Copper	2.2	2.3	2.3	2.8	4.4	4.3	3.1	1.5	2.9	2.1	1.2
Cyanide	0.046 J	0.033 J	0.053 U	0.053 U	0.058 U	0.053 U	0.054 U	0.054 U	0.04 J	0.054 U	0.057 U
Iron	5,100	5,800	7,200	9,600	11,000	13,000	14,000	11,000	9,100	8,400	3,500
Lead	7 J	4.1 J	3.3	4	5.5	6.6	3.7	2.4	3.2	3.9	2
Magnesium	360	370	640	370	790	790	500	580	610	700	1,000
Manganese	100	91	71	110	60	68	62	76	210	130	15
Mercury	0.0099 J	0.0067 J	0.017 U	0.017 U	0.017 U	0.015 J	0.017 U	0.017 U	0.0073 J	0.016 U	0.017 U
Nickel	3.2	2.9	2.8	2.3	4	4.5	2.3	1.3	3.2	3.7	1.2
Potassium	230	250	330	380	540	600	470	440	430	550	440
Selenium	0.29	0.075 B	0.2 B	0.3	0.3	0.29	0.45	0.26	0.27	0.13	0.13
Silver	0.019 J	0.014 J	0.017 B	0.023 B	0.029 J	0.032 J	0.028 J	0.025 J	0.025 J	0.028 J	0.036 J
Sodium	280 J	460 J	340	460	450	770	560	610	200	380	410
Thallium	0.13	0.095	0.1	0.098	0.12	0.15	0.11	0.076	0.17	0.19	0.14
Vanadium	6.4	7.3	8.6	9.4	17	21	15	7.3	9.4	8.9	4.3
Zinc	14 B	11 B	10 B	11 B	15 B	16 B	11 B	13 B	13 B	18 B	7.6 L
Wet Chemistry											
pH (ph)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.6-1

Site 9 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S09-DP01			CBD-S09-DP02		CBD-S09-DP03		CBD-S09-DP04	
Sample ID	CBD-S09-SS01-1012	CBD-S09-SS01P-1012	CBD-S09-SB01-1315	CBD-S09-SS02-1012	CBD-S09-SB02-1315	CBD-S09-SS03-1012	CBD-S09-SB03-1315	CBD-S09-SS04-1012	CBD-S09-SB04-1315
Sample Date	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	13 - 15	0 - 0.5	13 - 15	0 - 0.5	13 - 15	0 - 0.5	13 - 15
Chemical Name									
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,1,2,2-Tetrachloroethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,1,2-Trichloroethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,1-Dichloroethane	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
1,1-Dichloroethene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,2,3-Trichlorobenzene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,2,4-Trichlorobenzene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,2-Dibromo-3-chloropropane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,2-Dibromoethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,2-Dichlorobenzene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,2-Dichloroethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,2-Dichloropropane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
1,3-Dichlorobenzene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
1,4-Dichlorobenzene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
2-Butanone	8.1 L	4.5 J	11 J	4 J	0.82 U	7 J	2.1 J	8.1 J	0.89 U
2-Hexanone	7.4 L	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
4-Methyl-2-pentanone	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Acetone	53 J	30 J	140	35	14 J	55	8.7 U	67	8.9 U
Benzene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.21 J	0.87 U	4.3	0.89 U
Bromochloromethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Bromodichloromethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Bromoform	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
Bromomethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Carbon disulfide	1.2 B	0.79 B	13 J	0.26 B	0.38 B	8.4 J	0.4 B	1.1 J	0.41 B
Carbon tetrachloride	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
Chlorobenzene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
Chloroethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Chloroform	0.29 B	0.21 B	0.32 B	0.19 B	0.53 B	0.18 B	0.43 U	0.26 B	0.41 B
Chloromethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
cis-1,2-Dichloroethene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
cis-1,3-Dichloropropene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
Cyclohexane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	3.4 J	0.89 U
Dibromochloromethane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Dichlorodifluoromethane (Freon-12)	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Ethylbenzene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	1.7	0.89 U
Isopropylbenzene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	1.1 J	0.44 U
m- and p-Xylene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	4.3	0.89 U
Methyl acetate	1.5 B	1.3 B	1.2 B	1.1 B	2.4 B	1.3 B	2.5 B	4.1 B	1.5 B
Methylcyclohexane	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	6.5 J	0.89 U
Methylene chloride	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Methyl-tert-butyl ether (MTBE)	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
o-Xylene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	2.9	0.44 U

TABLE D.6-1

Site 9 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S09-DP01			CBD-S09-DP02		CBD-S09-DP03		CBD-S09-DP04	
Sample ID	CBD-S09-SS01-1012	CBD-S09-SS01P-1012	CBD-S09-SB01-1315	CBD-S09-SS02-1012	CBD-S09-SB02-1315	CBD-S09-SS03-1012	CBD-S09-SB03-1315	CBD-S09-SS04-1012	CBD-S09-SB04-1315
Sample Date	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	13 - 15	0 - 0.5	13 - 15	0 - 0.5	13 - 15	0 - 0.5	13 - 15
Styrene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	1.8	0.44 U
Tetrachloroethene	0.63 UL	0.53 U	0.77 U	0.47 U	1.3 J	0.53 U	0.87 U	0.66 U	0.89 U
Toluene	0.34 B	0.53 U	0.44 B	0.47 U	0.82 U	0.28 B	0.87 U	8.6	0.42 B
trans-1,2-Dichloroethene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
trans-1,3-Dichloropropene	0.63 UL	0.53 U	0.77 U	0.47 U	0.82 U	0.53 U	0.87 U	0.66 U	0.89 U
Trichloroethene	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
Trichlorofluoromethane (Freon-11)	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
Vinyl chloride	0.32 UL	0.27 U	0.38 U	0.23 U	0.41 U	0.26 U	0.43 U	0.33 U	0.44 U
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
1,2,4,5-Tetrachlorobenzene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
2,2'-Oxybis(1-chloropropane)	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
2,3,4,6-Tetrachlorophenol	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
2,4,5-Trichlorophenol	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
2,4,6-Trichlorophenol	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
2,4-Dichlorophenol	7 U	7.1 U	10 U	7.6 U	5.9 U	7 U	5.7 U	15 U	5.9 U
2,4-Dimethylphenol	71 U	71 U	100 U	77 U	59 U	71 U	58 U	150 U	59 U
2,4-Dinitrophenol	350 U	360 U	510 U	390 U	300 U	350 U	290 U	780 U	300 U
2,4-Dinitrotoluene	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
2,6-Dinitrotoluene	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
2-Chloronaphthalene	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
2-Chlorophenol	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
2-Methylnaphthalene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
2-Methylphenol	14 U	14 U	20 U	15 U	12 U	14 U	11 U	31 U	12 U
2-Nitroaniline	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
2-Nitrophenol	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
3,3'-Dichlorobenzidine	710 U	710 U	1,000 U	770 U	590 U	710 U	580 U	1,500 U	590 U
3-Nitroaniline	71 U	71 U	100 U	77 U	59 U	71 U	58 U	150 U	59 U
4,6-Dinitro-2-methylphenol	35 U	36 U	51 U	39 U	30 U	35 U	35 J	78 U	30 U
4-Bromophenyl-phenylether	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
4-Chloro-3-methylphenol	14 U	14 U	20 U	15 U	12 U	14 U	11 U	31 U	12 U
4-Chloroaniline	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
4-Chlorophenyl-phenylether	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
4-Methylphenol	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
4-Nitroaniline	71 U	71 U	100 U	77 U	59 U	71 U	58 U	150 U	59 U
4-Nitrophenol	71 U	71 U	100 U	77 U	59 U	71 U	58 U	150 U	59 U
Acenaphthene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Acenaphthylene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Acetophenone	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
Anthracene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	2.2 J	2.9 U	12 J	3 U
Atrazine	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
Benzaldehyde	35 UL	36 UL	51 UL	39 UL	30 UL	35 UL	29 UL	78 UL	30 UL
Benzo(a)anthracene	3.5 U	3.6 U	5.1 U	10 J	3 U	14 J	2.9 U	150 J	3 U
Benzo(a)pyrene	14 U	29 U	10 U	31 U	1.2 U	18 J	1.2 U	46 J	1.2 U
Benzo(b)fluoranthene	4.3 B	7.1 U	10 U	16 J	5.9 U	20 J	5.8 U	370 J	5.9 U

TABLE D.6-1

Site 9 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S09-DP01			CBD-S09-DP02		CBD-S09-DP03		CBD-S09-DP04	
Sample ID	CBD-S09-SS01-1012	CBD-S09-SS01P-1012	CBD-S09-SB01-1315	CBD-S09-SS02-1012	CBD-S09-SB02-1315	CBD-S09-SS03-1012	CBD-S09-SB03-1315	CBD-S09-SS04-1012	CBD-S09-SB04-1315
Sample Date	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	13 - 15	0 - 0.5	13 - 15	0 - 0.5	13 - 15	0 - 0.5	13 - 15
Benzo(g,h,i)perylene	11 B	3.6 U	5.1 U	7.8 B	3 U	12 B	2.9 U	91 J	3 U
Benzo(k)fluoranthene	7.1 UL	7.1 U	10 U	5.4 B	5.9 U	8 B	5.8 U	91 J	5.9 U
bis(2-Chloroethoxy)methane	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
bis(2-Chloroethyl)ether	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
bis(2-Ethylhexyl)phthalate	16 J	36 U	14 J	12 J	12 J	9.4 B	8.4 B	91 J	11 J
Butylbenzylphthalate	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
Caprolactam	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
Carbazole	71 U	71 U	100 U	77 U	59 U	71 U	58 U	150 U	59 U
Chrysene	2.9 B	3.6 U	5.1 U	9.3 B	3 U	13 B	2.9 U	170 J	3 U
Dibenz(a,h)anthracene	14 U	29 U	10 U	31 U	1.2 U	7.1 U	1.2 U	30 U	1.2 U
Dibenzofuran	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Diethylphthalate	7.9 B	6.2 B	12 B	8.5 B	8.6 B	8.7 B	7.8 B	15 U	8.5 B
Dimethyl phthalate	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
Di-n-butylphthalate	35 U	36 U	51 U	39 U	30 U	35 U	29 U	78 U	30 U
Di-n-octylphthalate	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Fluoranthene	3.6 J	3.6 U	5.1 U	12 J	3 U	18 J	2.9 U	210	3 U
Fluorene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Hexachlorobenzene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Hexachlorobutadiene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Hexachlorocyclopentadiene	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
Hexachloroethane	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Indeno(1,2,3-cd)pyrene	7.1 U	7.1 U	10 U	7.7 U	5.9 U	11 B	5.8 U	88 J	5.9 U
Isophorone	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Naphthalene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
n-Nitroso-di-n-propylamine	7.1 U	7.1 U	10 U	7.7 U	5.9 U	7.1 U	5.8 U	15 U	5.9 U
n-Nitrosodiphenylamine	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Nitrobenzene	3.5 U	3.6 U	5.1 U	3.9 U	3 U	3.5 U	2.9 U	7.8 U	3 U
Pentachlorophenol	71 U	71 U	100 U	77 U	59 U	71 U	58 U	150 U	59 U
Phenanthrene	2.1 J	3.6 U	5.1 U	8.5 J	3 U	8 J	2.9 U	130	3 U
Phenol	7 U	7.1 U	10 U	7.6 U	5.9 U	7 U	5.7 U	15 U	5.9 U
Pyrene	5.7 J	7.1 U	10 U	20 J	5.9 U	25 J	5.7 U	320 J	5.9 U
Pesticide/Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1262	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (MG/KG)									
Aluminum	3,300	3,200	7,100	4,200	8,200	4,700	7,800	2,600	5,000
Antimony	0.13 B	0.1 B	0.11 B	0.38	0.3	0.88	0.22 B	0.095 B	0.14 B

TABLE D.6-1

Site 9 Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S09-DP01			CBD-S09-DP02		CBD-S09-DP03		CBD-S09-DP04	
Sample ID	CBD-S09-SS01-1012	CBD-S09-SS01P-1012	CBD-S09-SB01-1315	CBD-S09-SS02-1012	CBD-S09-SB02-1315	CBD-S09-SS03-1012	CBD-S09-SB03-1315	CBD-S09-SS04-1012	CBD-S09-SB04-1315
Sample Date	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12	10/12/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	13 - 15	0 - 0.5	13 - 15	0 - 0.5	13 - 15	0 - 0.5	13 - 15
Arsenic	0.62	0.42	3.1	2.2	1.1	2.7	3.3	0.87	4.4
Barium	11	10	18	19	16	22	15	9.7	9.9
Beryllium	0.26	0.2	0.48	0.3	0.89	0.26	1.4	0.18	0.18
Cadmium	0.076	0.05	1.5	0.29	0.23	0.16	0.37	0.03 J	0.37
Calcium	900	840	3,500	1,100	1,000	2,900	1,400	7,900	1,600
Chromium (hexavalent)	0.6	0.19 J	0.31 U	0.15 J	0.89	0.5	0.98	1.05	0.29 J
Chromium	12	12	28	18	22	15	25	9.1	28
Cobalt	0.64	0.52	2.2	2.1	44	1.9	3.6	0.68	0.76
Copper	3.1	3.7	3.7	13	3.9	4.2	4.6	1.8	3
Cyanide	0.053 U	0.053 U	0.077 U	0.058 U	0.089 U	0.053 U	0.087 U	0.057 U	0.089 U
Iron	3,200	2,900	13,000	9,100	10,000	13,000	17,000	3,500	9,300
Lead	3.6 J	2.9 J	5	28	5	11	4.9	1.9	4.9
Magnesium	750	750	3,500	1,800	2,300	1,300	2,600 K	810	1,400
Manganese	15 J	7.2 J	40	54	260	61	34	29	3.8
Mercury	0.041 J	0.039 J	0.017 U	0.047 J	0.015 J	0.012 J	0.0065 J	0.017 U	0.0082 J
Nickel	1.1 J	0.89 J	9.8	9	6.5	5	5.2	1.5	2
Potassium	530	530	1,900	620	1,300	670	1,700	470	1,100
Selenium	0.25	0.22	0.59	0.25	0.36 B	0.5	0.3 B	0.087 B	1 B
Silver	2.7 J	3.9 J	0.096	0.081	0.055	0.043 J	0.055	0.041 J	0.064
Sodium	28 B	21 B	89 B	57 B	120	25 B	100 B	25 U	98 B
Thallium	0.15	0.13	0.2	0.15	0.25	0.059 B	0.2	0.15	0.2
Vanadium	6.4	6.9	14	12	7.5	17	13 K	4.7	15
Zinc	15 B	15 B	59	47	80	20	150	8.2	55
Wet Chemistry									
pH (ph)	7.6	NA	NA	8.4	NA	8.7	NA	12	NA
Total organic carbon (TOC) (mg/kg)	840 J	NA	NA	760 J	NA	4,400	NA	1,000 J	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.6-2

Site 9 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S09-DP03	
Sample ID	CBD-S09-GW01-1012	CBD-S09-GW01P-1012
Sample Date	10/15/12	10/15/12
Chemical Name		
Volatile Organic Compounds (UG/L)		
1,1,1-Trichloroethane	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U
1,2,3-Trichlorobenzene	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U
1,2-Dibromoethane	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U
2-Butanone	1 U	1 U
2-Hexanone	1 U	1 U
4-Methyl-2-pentanone	1 U	1 U
Acetone	2 U	2 UJ
Benzene	0.2 U	0.2 U
Bromochloromethane	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U
Bromoform	1 U	1 U
Bromomethane	0.87 B	0.5 U
Carbon disulfide	4.7 B	1 U
Carbon tetrachloride	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U
Chloroform	0.2 U	0.2 U
Chloromethane	0.51 B	0.5 U
cis-1,2-Dichloroethene	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U
Cyclohexane	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U
m- and p-Xylene	1 U	1 U
Methyl acetate	1.9 B	1.8 B
Methylcyclohexane	1 U	1 U
Methylene chloride	1 U	1 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U
o-Xylene	0.2 U	0.2 U
Styrene	0.5 U	0.5 U
Tetrachloroethene	0.5 U	0.5 U
Toluene	0.5 U	0.5 U
trans-1,2-Dichloroethene	0.5 U	0.5 U

TABLE D.6-2

Site 9 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S09-DP03	
Sample ID	CBD-S09-GW01-1012	CBD-S09-GW01P-1012
Sample Date	10/15/12	10/15/12
trans-1,3-Dichloropropene	0.5 U	0.5 U
Trichloroethene	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U
Vinyl chloride	0.5 U	0.5 U
Semivolatile Organic Compounds (UG/L)		
1,1-Biphenyl	0.1 U	0.1 U
1,2,4,5-Tetrachlorobenzene	0.1 U	0.1 U
2,2'-Oxybis(1-chloropropane)	0.1 U	0.1 U
2,3,4,6-Tetrachlorophenol	0.5 U	0.5 U
2,4,5-Trichlorophenol	0.5 U	0.5 U
2,4,6-Trichlorophenol	0.5 U	0.5 U
2,4-Dichlorophenol	0.25 U	0.25 U
2,4-Dimethylphenol	0.5 U	0.5 U
2,4-Dinitrophenol	5 U	5 U
2,4-Dinitrotoluene	0.1 U	0.1 U
2,6-Dinitrotoluene	0.25 U	0.25 U
2-Chloronaphthalene	0.1 U	0.1 U
2-Chlorophenol	0.1 U	0.1 U
2-Methylnaphthalene	0.1 U	0.1 U
2-Methylphenol	0.1 U	0.1 U
2-Nitroaniline	0.5 U	0.5 U
2-Nitrophenol	0.25 U	0.25 U
3,3'-Dichlorobenzidine	10 U	10 U
3-Nitroaniline	0.5 U	0.5 U
4,6-Dinitro-2-methylphenol	1 U	1 U
4-Bromophenyl-phenylether	0.1 U	0.1 U
4-Chloro-3-methylphenol	0.5 U	0.5 U
4-Chloroaniline	0.5 U	0.5 U
4-Chlorophenyl-phenylether	0.05 U	0.05 U
4-Methylphenol	0.5 U	0.5 U
4-Nitroaniline	0.5 U	0.5 U
4-Nitrophenol	2 U	2 U
Acenaphthene	0.05 U	0.05 U
Acenaphthylene	0.05 U	0.05 U
Acetophenone	0.1 U	0.1 U
Anthracene	0.05 U	0.05 U
Atrazine	0.1 U	0.1 U
Benzaldehyde	0.25 U	0.25 U
Benzo(a)anthracene	0.02 U	0.02 U
Benzo(a)pyrene	0.02 U	0.02 U
Benzo(b)fluoranthene	0.02 U	0.02 U
Benzo(g,h,i)perylene	0.1 U	0.09 B
Benzo(k)fluoranthene	0.02 U	0.02 U
bis(2-Chloroethoxy)methane	0.05 U	0.05 U
bis(2-Chloroethyl)ether	0.1 U	0.1 U
bis(2-Ethylhexyl)phthalate	0.5 U	0.5 U
Butylbenzylphthalate	0.5 U	0.5 U
Caprolactam	1 UL	1 UL
Carbazole	0.5 U	0.5 U

TABLE D.6-2

Site 9 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S09-DP03	
Sample ID	CBD-S09-GW01-1012	CBD-S09-GW01P-1012
Sample Date	10/15/12	10/15/12
Chrysene	0.1 U	0.4 B
Dibenz(a,h)anthracene	0.02 U	0.02 U
Dibenzofuran	0.1 U	0.1 U
Diethylphthalate	0.11 B	0.16 B
Dimethyl phthalate	0.25 U	0.25 U
Di-n-butylphthalate	0.5 U	0.5 U
Di-n-octylphthalate	0.5 U	0.5 U
Fluoranthene	0.05 U	0.06 B
Fluorene	0.05 U	0.05 U
Hexachlorobenzene	0.1 U	0.1 U
Hexachlorobutadiene	0.05 U	0.05 U
Hexachlorocyclopentadiene	0.1 U	0.1 U
Hexachloroethane	0.1 U	0.1 U
Indeno(1,2,3-cd)pyrene	0.02 U	0.02 U
Isophorone	0.1 U	0.1 U
Naphthalene	0.03 J	0.05 J
n-Nitroso-di-n-propylamine	0.1 U	0.1 U
n-Nitrosodiphenylamine	0.1 U	0.1 U
Nitrobenzene	0.25 U	0.25 U
Pentachlorophenol	0.5 U	0.5 U
Phenanthrene	0.05 U	0.03 B
Phenol	0.05 U	0.05 U
Pyrene	0.1 U	0.06 B
Pesticide/Polychlorinated Biphenyls (UG/L)		
Aroclor-1016	NA	NA
Aroclor-1221	NA	NA
Aroclor-1232	NA	NA
Aroclor-1242	NA	NA
Aroclor-1248	NA	NA
Aroclor-1254	NA	NA
Aroclor-1260	NA	NA
Aroclor-1262	NA	NA
Aroclor-1268	NA	NA
Total Metals (UG/L)		
Aluminum	72 B	1,100 J
Antimony	0.5 U	0.4 B
Arsenic	0.5 U	0.54 J
Barium	47	62
Beryllium	0.4 U	0.2 J
Cadmium	1.2	1.3
Calcium	14,000 J	34,000 J
Chromium	0.91 J	7.9 J
Cobalt	1.7	3.1
Copper	2.6 B	13 J
Cyanide	4 U	4 U
Iron	140 J	1,800 J
Lead	0.22 J	0.93 J
Magnesium	4,600 J	6,300 J

TABLE D.6-2

Site 9 Validated Raw Analytical Data - Groundwater

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-S09-DP03	
Sample ID	CBD-S09-GW01-1012	CBD-S09-GW01P-1012
Sample Date	10/15/12	10/15/12
Manganese	21 J	110 J
Mercury	0.1 U	0.1 U
Nickel	5.1 J	15 J
Potassium	9,100	10,000
Selenium	1 U	1 U
Silver	0.1 U	0.1 U
Sodium	28,000	32,000
Thallium	0.22 B	0.29 J
Vanadium	0.45 J	2.9 J
Zinc	29 B	56 B
Dissolved Metals (UG/L)		
Aluminum, Dissolved	17 B	23 B
Antimony, Dissolved	0.52 B	0.28 B
Arsenic, Dissolved	2	0.27 J
Barium, Dissolved	37	38
Beryllium, Dissolved	0.2 J	0.4 U
Cadmium, Dissolved	1.3	1.1
Calcium, Dissolved	15,000 L	13,000
Chromium (hexavalent), Dissolved	10 UJ	10 UJ
Chromium, Dissolved	1	0.6 J
Cobalt, Dissolved	1.5	1.5
Copper, Dissolved	1.6 B	1.4 B
Iron, Dissolved	8.1 J	30 J
Lead, Dissolved	0.45 J	0.5 U
Magnesium, Dissolved	5,100 L	4,700
Manganese, Dissolved	15	15
Mercury, Dissolved	0.1 U	0.1 U
Nickel, Dissolved	3.7	3.6
Potassium, Dissolved	9,500	8,900
Selenium, Dissolved	1.6	0.64 J
Silver, Dissolved	0.51	0.1 U
Sodium, Dissolved	32,000 L	29,000
Thallium, Dissolved	1	0.32 J
Vanadium, Dissolved	0.66 J	0.31 J
Zinc, Dissolved	25 B	22 B

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

UG/L - Micrograms per liter

TABLE D.7-1

AOC C Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-AOC-DP01			CBD-AOC-DP02		CBD-AOC-DP03		CBD-AOC-DP04		CBD-AOC-DP05	
Sample ID	CBD-AOC-SS01-1012	CBD-AOC-SS01P-1012	CBD-AOC-SB01-2830	CBD-AOC-SS02-1012	CBD-AOC-SB02-2830	CBD-AOC-SS03-1012	CBD-AOC-SB03-2830	CBD-AOC-SS04-1012	CBD-AOC-SB04-2628	CBD-AOC-SS05-1012	CBD-AOC-SB05-2729
Sample Date	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 06	27 - 29
Chemical Name											
Volatile Organic Compounds (UG/KG)											
1,1,1-Trichloroethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,1,2,2-Tetrachloroethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,1,2-Trichloroethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,1-Dichloroethane	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
1,1-Dichloroethene	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,2,3-Trichlorobenzene	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,2,4-Trichlorobenzene	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,2-Dibromo-3-chloropropane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,2-Dibromoethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,2-Dichlorobenzene	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,2-Dichloroethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,2-Dichloropropane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
1,3-Dichlorobenzene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
1,4-Dichlorobenzene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
2-Butanone	9.2 J	18	3.2 J	23 L	0.57 U	14	0.52 U	19 L	0.52 U	3.4 J	0.59 U
2-Hexanone	0.63 U	0.79 J	0.68 U	1.4 L	0.57 U	0.64 J	0.52 U	1.1 L	0.52 U	0.44 U	0.59 U
4-Methyl-2-pentanone	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Acetone	770 J	630 J	51 B	750 J	5.7 U	580	5.2 U	450 J	5.2 U	140 B	19 B
Benzene	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Bromochloromethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Bromodichloromethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Bromoform	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Bromomethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.38 B	0.59 U
Carbon disulfide	0.51 B	0.48 B	0.49 B	0.51 B	0.45 B	0.42 B	0.38 B	0.46 B	0.37 B	0.38 B	0.73 B
Carbon tetrachloride	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Chlorobenzene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Chloroethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Chloroform	0.24 B	0.31 B	0.29 B	0.22 B	0.29 B	0.27 U	0.27 B	0.21 B	0.26 U	0.27 B	0.26 B
Chloromethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
cis-1,2-Dichloroethene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
cis-1,3-Dichloropropene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Cyclohexane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Dibromochloromethane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Dichlorodifluoromethane (Freon-12)	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Ethylbenzene	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Isopropylbenzene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
m- and p-Xylene	0.48 J	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Methyl acetate	1.6 B	4.4 B	1.1 B	7.4 B	0.8 B	2 B	1.6 B	3.2 B	0.81 B	0.98 B	1.6 B
Methylcyclohexane	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Methylene chloride	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Methyl-tert-butyl ether (MTBE)	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
o-Xylene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Styrene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Tetrachloroethene	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Toluene	3.5 J	7.7 J	0.68 U	9.5 L	0.57 U	13	0.52 U	22 L	0.52 U	0.47 B	0.59 U

TABLE D.7-1

AOC C Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-AOC-DP01			CBD-AOC-DP02		CBD-AOC-DP03		CBD-AOC-DP04		CBD-AOC-DP05	
Sample ID	CBD-AOC-SS01-1012	CBD-AOC-SS01P-1012	CBD-AOC-SB01-2830	CBD-AOC-SS02-1012	CBD-AOC-SB02-2830	CBD-AOC-SS03-1012	CBD-AOC-SB03-2830	CBD-AOC-SS04-1012	CBD-AOC-SB04-2628	CBD-AOC-SS05-1012	CBD-AOC-SB05-2729
Sample Date	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 06	27 - 29
Chemical Name											
trans-1,2-Dichloroethene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
trans-1,3-Dichloropropene	0.63 U	0.6 U	0.68 U	0.58 UL	0.57 U	0.54 U	0.52 U	0.53 UL	0.52 U	0.44 U	0.59 U
Trichloroethene	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Trichlorofluoromethane (Freon-11)	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Vinyl chloride	0.31 U	0.3 U	0.34 U	0.29 UL	0.29 U	0.27 U	0.26 U	0.26 UL	0.26 U	0.22 U	0.3 U
Semivolatile Organic Compounds (UG/KG)											
1,1-Biphenyl	19 U	19 U	19 U	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
1,2,4,5-Tetrachlorobenzene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
2,2'-Oxybis(1-chloropropane)	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
2,3,4,6-Tetrachlorophenol	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
2,4,5-Trichlorophenol	19 U	19 U	19 U	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
2,4,6-Trichlorophenol	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
2,4-Dichlorophenol	3.7 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.7 U	3.5 U	3.8 U	3.6 U	3.9 U
2,4-Dimethylphenol	38 U	37 U	37 U	36 U	38 U	36 U	38 U	35 U	39 U	37 U	39 U
2,4-Dinitrophenol	190 U	190 U	190 U	180 U	190 U	180 U	190 U	180 U	190 U	180 U	200 U
2,4-Dinitrotoluene	19 U	19 U	19 U	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
2,6-Dinitrotoluene	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
2-Chloronaphthalene	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
2-Chlorophenol	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
2-Methylnaphthalene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
2-Methylphenol	7.4 U	7.4 U	7.4 U	7.2 U	7.6 U	7.2 U	7.4 U	7 U	7.7 U	7.3 U	7.8 U
2-Nitroaniline	19 U	19 U	19 U	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
2-Nitrophenol	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
3,3'-Dichlorobenzidine	380 U	370 U	370 U	360 U	380 U	360 U	380 U	350 U	390 U	370 U	390 U
3-Nitroaniline	38 U	37 U	37 U	36 U	38 U	36 U	38 U	35 U	39 U	37 U	39 U
4,6-Dinitro-2-methylphenol	19 U	19 U	19 U	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
4-Bromophenyl-phenylether	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
4-Chloro-3-methylphenol	7.4 U	7.4 U	7.4 U	7.2 U	7.6 U	7.2 U	7.4 U	7 U	7.7 U	7.3 U	7.8 U
4-Chloroaniline	19 U	19 U	19 U	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
4-Chlorophenyl-phenylether	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
4-Methylphenol	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
4-Nitroaniline	38 U	37 U	37 U	36 U	38 U	36 U	38 U	35 U	39 U	37 U	39 U
4-Nitrophenol	38 U	37 U	37 U	36 U	38 U	36 U	38 U	35 U	39 U	37 U	39 U
Acenaphthene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.4 J	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Acenaphthylene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Acetophenone	19 U	19 U	19 U	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
Anthracene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Atrazine	19 U	19 U	19 U	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
Benzaldehyde	19 L	12 L	19 R	200 L	19 UL	18 UL	19 R	18 R	19 R	18 UL	20 UL
Benzo(a)anthracene	4 B	4.1 B	1.9 U	4.1 J	1.9 U	17 B	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Benzo(a)pyrene	7.6 U	7.5 U	0.75 U	5.8 U	0.77 U	7.3 U	6 U	2.8 U	3.1 U	5.9 U	0.79 U
Benzo(b)fluoranthene	5.8 B	3 B	3.7 U	2.2 J	3.8 U	18 B	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
Benzo(g,h,i)perylene	3.3 B	2.6 B	1.9 U	1.8 U	1.9 U	6.8 B	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Benzo(k)fluoranthene	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	13 B	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
bis(2-Chloroethoxy)methane	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
bis(2-Chloroethyl)ether	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U

TABLE D.7-1

AOC C Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-AOC-DP01			CBD-AOC-DP02		CBD-AOC-DP03		CBD-AOC-DP04		CBD-AOC-DP05	
Sample ID	CBD-AOC-SS01-1012	CBD-AOC-SS01P-1012	CBD-AOC-SB01-2830	CBD-AOC-SS02-1012	CBD-AOC-SB02-2830	CBD-AOC-SS03-1012	CBD-AOC-SB03-2830	CBD-AOC-SS04-1012	CBD-AOC-SB04-2628	CBD-AOC-SS05-1012	CBD-AOC-SB05-2729
Sample Date	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 06	27 - 29
Chemical Name											
bis(2-Ethylhexyl)phthalate	8.4 B	9.4 B	19 U	8.6 B	19 U	8.5 B	19 U	7.4 B	19 U	15 B	53
Butylbenzylphthalate	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
Caprolactam	19 U	19 U	19 UL	18 U	19 U	18 U	19 U	18 U	19 U	18 U	20 U
Carbazole	38 U	37 U	37 U	36 U	38 U	36 U	38 U	35 U	39 U	37 U	39 U
Chrysene	4 B	3.4 B	1.9 U	1.9 B	1.9 U	14 B	1.9 U	1.1 B	1.9 U	1.8 U	2 U
Dibenz(a,h)anthracene	7.6 U	7.5 U	0.75 U	5.8 U	0.77 U	7.3 U	6 U	2.8 U	3.1 U	5.9 U	0.79 U
Dibenzofuran	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Diethylphthalate	13 B	11 B	3.7 U	13 B	6.5 B	12 B	13 B	9.9 B	16 B	11 B	8.4 B
Dimethyl phthalate	2.9 B	3 B	3.7 U	2.2 J	3.8 U	2.5 B	3.8 U	3.5 U	3.9 U	3 B	3.9 U
Di-n-butylphthalate	19 U	19 U	32 B	18 U	19 U	18 U	34 B	16 B	21 B	18 U	20 U
Di-n-octylphthalate	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Fluoranthene	9.1 B	1.9 U	1.9 U	5.6 J	1.9 U	30 B	1.9 U	1.8 B	1.9 U	1.8 U	0.8 B
Fluorene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.1 B	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Hexachlorobenzene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Hexachlorobutadiene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Hexachlorocyclopentadiene	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
Hexachloroethane	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Indeno(1,2,3-cd)pyrene	3.6 B	3.7 U	3.7 U	3.6 U	3.8 U	6.8 B	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
Isophorone	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Naphthalene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
n-Nitroso-di-n-propylamine	3.8 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.8 U	3.5 U	3.9 U	3.7 U	3.9 U
n-Nitrosodiphenylamine	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Nitrobenzene	1.9 U	1.9 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	1.9 U	1.8 U	2 U
Pentachlorophenol	38 U	37 U	37 U	36 U	38 U	36 U	38 U	35 U	39 U	37 U	39 U
Phenanthrene	4.4 B	3 B	1.9 U	1.9 J	1.9 U	11 B	1.9 U	1.8 B	1.9 U	1.1 B	2 U
Phenol	3.7 U	3.7 U	3.7 U	3.6 U	3.8 U	3.6 U	3.7 U	3.5 U	3.8 U	3.6 U	3.9 U
Pyrene	7.7 B	3.7 U	3.7 U	6 J	3.8 U	35 B	3.7 U	2.1 B	3.8 U	3.6 U	3.9 U
Pesticide/Polychlorinated Biphenyls (UG/KG)											
Aroclor-1016	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Aroclor-1221	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Aroclor-1232	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Aroclor-1242	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Aroclor-1248	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Aroclor-1254	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Aroclor-1260	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Aroclor-1262	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Aroclor-1268	15 U	15 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U	14 U	15 U
Total Metals (MG/KG)											
Aluminum	9,600	11,000	11,000	10,000	3,500	10,000	2,000	9,100	2,400	13,000	2,000
Antimony	0.23	0.19	0.59	0.15	0.24	0.11	0.12	0.085 J	0.25	0.13	0.19
Arsenic	2.1	2.2	5	2.1	3.3	1.9	1.4	2.1	3.4	3.6	1.7
Barium	35	36	22	33	30	52	8.3	38	12	55	70
Beryllium	0.43	0.44	3.9	0.26	2.1	0.41	1.5	0.33	1.9	0.44	2.7
Cadmium	0.087	0.065	1.1	0.033 J	0.62	0.034 J	0.47	0.033 J	0.26	0.036 J	2.5
Calcium	310	290	38 B	340	160	160	100 B	260	140	260	890

TABLE D.7-1

AOC C Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach , Maryland

Station ID	CBD-AOC-DP01			CBD-AOC-DP02		CBD-AOC-DP03		CBD-AOC-DP04		CBD-AOC-DP05	
Sample ID	CBD-AOC-SS01-1012	CBD-AOC-SS01P-1012	CBD-AOC-SB01-2830	CBD-AOC-SS02-1012	CBD-AOC-SB02-2830	CBD-AOC-SS03-1012	CBD-AOC-SB03-2830	CBD-AOC-SS04-1012	CBD-AOC-SB04-2628	CBD-AOC-SS05-1012	CBD-AOC-SB05-2729
Sample Date	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12	10/16/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	28 - 30	0 - 0.5	26 - 28	0 - 06	27 - 29
Chemical Name											
Chromium (hexavalent)	0.22 U	0.22 U	0.26 J	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	8.8	9.4	8.8	11	9.4	9.3	7.7	7.9	14	14	8.6
Cobalt	3.8	3.9	52	3.3	120	3.4	25	3.7	7.9	4	30
Copper	3.3	3	2.4	3.3	4	2.3	1.5	2.7	2.9	3.6	1.6
Cyanide	0.053 J	0.054 J	0.056 U	0.054 U	0.16	0.027 J	0.056 U	0.053 U	0.058 U	0.055 U	0.059 U
Iron	8,300	9,500	6,700	11,000	9,700	8,700	4,200	10,000	13,000	15,000	12,000
Lead	20	16	1.9	6.6	2.2	8.5	1.8	7.5	2.2	9.8	1.4
Magnesium	840	930	760	1,000	690	890	670	820	660	1,300	470
Manganese	130	120	240	73	670	65	200	76	98	110	180
Mercury	0.019 J	0.019 J	0.0085 J	0.016 J	0.017 U	0.0092 J	0.017 U	0.0064 J	0.017 U	0.016 J	0.017 U
Nickel	6.2	6.2	36	5.8	49	6	15	5.3	19	6.8	11
Potassium	480	490	490	490	420	460	430	500	460	650	320
Selenium	0.31	0.37	1.3	0.31	0.45	0.34	0.14 B	0.16 B	0.25 B	0.3 B	0.035 B
Silver	0.044 J	0.031 J	0.026 B	0.043 J	0.023 B	0.029 J	0.025 J	0.027 J	0.022 J	0.04 J	0.017 B
Sodium	11 B	6.2 B	6.4 B	11 B	7 B	7.1 B	7.4 B	17 B	19 J	14 B	25 U
Thallium	0.12	0.12	0.49	0.13	0.92	0.12	0.48	0.099	0.18	0.16	0.22
Vanadium	14	14	9.2	17	6.5	13	6.3	13	8.8	24	7.1
Zinc	22 B	24	130 B	23	140	21 B	45 B	18 B	57 B	26 B	30 B
Wet Chemistry											
pH (ph)	5.2	NA	NA	5.2	NA	5.2	NA	5.4	NA	5.2	NA
Total organic carbon (TOC) (mg/kg)	9,300	NA	NA	11,000	NA	8,800	NA	6,100	NA	6,800	NA

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

K - Analyte present, value may be biased high, actual value may be lower

L - Analyte present, value may be biased low, actual value may be higher

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PH - pH units

UG/KG - Micrograms per kilogram

TABLE D.8-1

AOC D Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOD-SO01		CBD-AOD-SO02	CBD-AOD-SO03	CBD-AOD-SO04
Sample ID	CBD-AOD-SS01-1012	CBD-AOD-SS01P-1012	CBD-AOD-SS02-1012	CBD-AOD-SS03-1012	CBD-AOD-SS04-1012
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Chemical Name					
Volatile Organic Compounds (UG/KG)					
1,1,1-Trichloroethane	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA
Bromochloromethane	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA

TABLE D.8-1

AOC D Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOD-SO01		CBD-AOD-SO02	CBD-AOD-SO03	CBD-AOD-SO04
Sample ID	CBD-AOD-SS01-1012	CBD-AOD-SS01P-1012	CBD-AOD-SS02-1012	CBD-AOD-SS03-1012	CBD-AOD-SS04-1012
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Cyclohexane	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA
m- and p-Xylene	NA	NA	NA	NA	NA
Methyl acetate	NA	NA	NA	NA	NA
Methylcyclohexane	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)					
1,1-Biphenyl	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA

TABLE D.8-1

AOC D Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOD-SO01		CBD-AOD-SO02	CBD-AOD-SO03	CBD-AOD-SO04
Sample ID	CBD-AOD-SS01-1012	CBD-AOD-SS01P-1012	CBD-AOD-SS02-1012	CBD-AOD-SS03-1012	CBD-AOD-SS04-1012
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
2-Methylphenol	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA

TABLE D.8-1

AOC D Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOD-SO01		CBD-AOD-SO02	CBD-AOD-SO03	CBD-AOD-SO04
Sample ID	CBD-AOD-SS01-1012	CBD-AOD-SS01P-1012	CBD-AOD-SS02-1012	CBD-AOD-SS03-1012	CBD-AOD-SS04-1012
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Di-n-butylphthalate	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)					
Aroclor-1016	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA
Aroclor-1262	NA	NA	NA	NA	NA
Aroclor-1268	NA	NA	NA	NA	NA
Total Metals (MG/KG)					
Aluminum	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA

TABLE D.8-1

AOC D Validated Raw Analytical Data - Soil

Base-Wide Site Inspection Report

NRL-CBD, Chesapeake Beach, Maryland

Station ID	CBD-AOD-SO01		CBD-AOD-SO02	CBD-AOD-SO03	CBD-AOD-SO04
Sample ID	CBD-AOD-SS01-1012	CBD-AOD-SS01P-1012	CBD-AOD-SS02-1012	CBD-AOD-SS03-1012	CBD-AOD-SS04-1012
Sample Date	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Sample Depth (feet)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Beryllium	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA
Chromium (hexavalent)	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA
Lead	2,100	2,000	3,000	2,900	1,200
Magnesium	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA
Wet Chemistry					
pH (ph)	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	NA	NA	NA	NA	NA

Notes:

Shading indicates detections

NA - Not analyzed

MG/KG - Milligrams per kilogram

Appendix E
Human Health Risk Screening Tables

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 2

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Surface Soil Site 2	78-93-3	2-Butanone	2.8E-03 J	1.6E-02	MG/KG	CBD-S02-SS03-1012	5/5	0.0094 - 0.011	1.6E-02	N/A	2.7E+03 n	1.2E-01	SSL	NO	BSL
	591-78-6	2-Hexanone	7.0E-03 J	7.0E-03 J	MG/KG	CBD-S02-SS03-1012	1/5	0.0094 - 0.011	7.0E-03	N/A	2.0E+01 n	8.8E-04	SSL	NO	BSL
	67-64-1	Acetone	1.2E-01	3.5E-01 J	MG/KG	CBD-S02-SS03-1012	3/5	0.014 - 0.017	3.5E-01	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	79-20-9	Methyl acetate	7.9E-01 J	7.9E-01 J	MG/KG	CBD-S02-SS03-1012	1/5	0.0047 - 0.29	7.9E-01	N/A	7.8E+03 n	4.1E-01	SSL	NO	BSL
	100-42-5	Styrene	1.7E-03	1.7E-03	MG/KG	CBD-S02-SS03-1012	1/5	0.00094 - 0.0011	1.7E-03	N/A	6.0E+02 n	1.3E-01	SSL	NO	BSL
	108-88-3	Toluene	2.1E-04 J	5.1E-03	MG/KG	CBD-S02-SS02-1012	3/5	0.0019 - 0.0023	5.1E-03	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	83-32-9	Acenaphthene	1.1E-03 K	1.1E-03 K	MG/KG	CBD-S02-SS05-1012	1/5	0.018 - 0.019	1.1E-03	N/A	3.6E+02 n	5.5E-01	SSL	NO	BSL
	120-12-7	Anthracene	1.1E-03 K	1.1E-03 K	MG/KG	CBD-S02-SS05-1012	1/5	0.018 - 0.019	1.1E-03	N/A	1.8E+03 n	5.8E+00	SSL	NO	BSL
	100-52-7	Benzaldehyde	1.4E-02 L	2.5E-02 L	MG/KG	CBD-S02-SS05-1012	2/5	0.091 - 0.097	2.5E-02	N/A	7.8E+02 n	4.3E-02	SSL	NO	BSL
	56-55-3	Benzo(a)anthracene	2.1E-03 J	6.6E-03 K	MG/KG	CBD-S02-SS05-1012	2/5	0.018 - 0.019	6.6E-03	N/A	1.6E-01 c	4.2E-03	SSL	NO	BSL
	50-32-8	Benzo(a)pyrene	1.1E-03 J	6.7E-03	MG/KG	CBD-S02-SS05-1012	2/5	0.0022 - 0.0044	6.7E-03	N/A	1.6E-02 c	4.0E-03	SSL	NO	BSL
	205-99-2	Benzo(b)fluoranthene	2.5E-03 J	9.6E-03 K	MG/KG	CBD-S02-SS05-1012	2/5	0.018 - 0.019	9.6E-03	N/A	1.6E-01 c	4.1E-02	SSL	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.4E-03 J	2.9E-03 K	MG/KG	CBD-S02-SS05-1012	2/5	0.036 - 0.038	2.9E-03	N/A	1.8E+02 n	N/A	N/A	NO	BSL
	207-08-9	Benzo(k)fluoranthene	5.9E-03 K	5.9E-03 K	MG/KG	CBD-S02-SS05-1012	1/5	0.018 - 0.019	5.9E-03	N/A	1.6E+00 c	4.0E-01	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	2.2E-02 J	1.1E-01 K	MG/KG	CBD-S02-SS05-1012	2/5	0.036 - 0.038	1.1E-01	N/A	2.9E+02 c	2.4E-01	SSL	NO	BSL
	218-01-9	Chrysene	1.8E-03 J	7.0E-03 K	MG/KG	CBD-S02-SS05-1012	2/5	0.018 - 0.019	7.0E-03	N/A	1.6E+01 c	1.2E+00	SSL	NO	BSL
	131-11-3	Dimethyl phthalate	2.5E-03 J	2.6E-03 J	MG/KG	CBD-S02-SS02-1012	2/5	0.018 - 0.019	2.6E-03	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	1.1E-03 J	9.9E-03 K	MG/KG	CBD-S02-SS05-1012	4/5	0.018 - 0.019	9.9E-03	N/A	2.4E+02 n	8.9E+00	SSL	NO	BSL
	86-73-7	Fluorene	1.1E-03 K	1.1E-03 K	MG/KG	CBD-S02-SS05-1012	1/5	0.036 - 0.038	1.1E-03	N/A	2.4E+02 n	5.4E-01	SSL	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	3.7E-03 K	3.7E-03 K	MG/KG	CBD-S02-SS05-1012	1/5	0.036 - 0.038	3.7E-03	N/A	1.6E-01 c	1.3E-01	SSL	NO	BSL
	85-01-8	Phenanthrene	1.1E-03 J	5.5E-03 K	MG/KG	CBD-S02-SS05-1012	5/5	0.018 - 0.019	5.5E-03	N/A	1.8E+03 n	N/A	N/A	NO	BSL
	129-00-0	Pyrene	3.9E-03 J	1.1E-02 K	MG/KG	CBD-S02-SS05-1012	2/5	0.018 - 0.019	1.1E-02	N/A	1.8E+02 n	1.3E+00	SSL	NO	BSL
	11096-82-5	Aroclor-1260	3.6E-03 J	5.1E-03 J	MG/KG	CBD-S02-SS05-1012	2/5	0.018 - 0.019	5.1E-03	N/A	2.4E-01 c	5.5E-03	SSL	NO	BSL
	7429-90-5	Aluminum	7.3E+03	1.2E+04	MG/KG	CBD-S02-SS03-1012	5/5	9.3 - 250	1.2E+04	1.7E+04	7.7E+03 n	3.0E+03	SSL	NO	BBK
	7440-36-0	Antimony	1.9E-01	2.5E-01	MG/KG	CBD-S02-SS03-1012	5/5	0.093 - 0.1	2.5E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	3.3E+00 L	5.1E+00	MG/KG	CBD-S02-SS04-1012	5/5	0.093 - 0.1	5.1E+00	1.0E+01	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	1.2E+01	3.0E+01	MG/KG	CBD-S02-SS04-1012	5/5	0.93 - 1	3.0E+01	6.7E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.9E-01	3.6E-01	MG/KG	CBD-S02-SS04-1012	5/5	0.093 - 0.1	3.6E-01	7.6E-01	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	3.1E-02 J	4.4E-02 J	MG/KG	CBD-S02-SS02-1012	4/5	0.047 - 0.05	4.4E-02	1.6E+00	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	3.2E+02	4.2E+02	MG/KG	CBD-S02-SS01-1012	3/5	46 - 50	4.2E+02	3.0E+03	NUT	N/A	N/A	NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**2.3E+00**	**2.3E+00**	**MG/KG**	**CBD-S02-SS01-1012**	**1/1**	**0.44 - 0.44**	**2.3E+00**	**N/A**	**3.0E-01 c**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	9.6E+00	1.5E+01	MG/KG	CBD-S02-SS03-1012 : CBD-S02-SS04-1012	5/5	0.47 - 0.5	1.5E+01	4.2E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	8.3E-01	2.9E+00	MG/KG	CBD-S02-SS01-1012	5/5	0.093 - 0.1	2.9E+00	4.8E+00	2.3E+00 n	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	3.7E+00	5.5E+00	MG/KG	CBD-S02-SS03-1012	5/5	0.093 - 0.1	5.5E+00	2.1E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	7439-89-6	Iron	1.1E+04	1.7E+04	MG/KG	CBD-S02-SS03-1012	5/5	4.6 - 1200	1.7E+04	7.1E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	5.9E+00	8.9E+00	MG/KG	CBD-S02-SS01-1012	5/5	0.093 - 0.5	8.9E+00	6.2E+01	4.0E+02 n	N/A	N/A	NO	BSL

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 2

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
						CBD-S02-SS01-1012 :									
	7439-95-4	Magnesium	5.2E+02	8.2E+02	MG/KG	CBD-S02-SS03-1012	5/5	46 - 50	8.2E+02	1.2E+03	NUT	N/A	N/A	NO	NUT
	7439-96-5	Manganese	2.3E+01	5.5E+01	MG/KG	CBD-S02-SS03-1012	5/5	0.93 - 1	5.5E+01	3.3E+02	1.8E+02 n	2.8E+00	SSL	NO	BSL
	7439-97-6	Mercury	6.2E-03 J	2.1E-02 J	MG/KG	CBD-S02-SS02-1012	4/5	0.05 - 0.05	2.1E-02	1.1E-01	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	1.7E+00	8.2E+00	MG/KG	CBD-S02-SS01-1012	5/5	0.093 - 0.5	8.2E+00	1.0E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	4.5E+02	6.6E+02	MG/KG	CBD-S02-SS03-1012	5/5	46 - 50	6.6E+02	1.3E+03	NUT	N/A	N/A	NO	NUT
	7782-49-2	Selenium	2.2E-01	4.2E-01	MG/KG	CBD-S02-SS04-1012	5/5	0.093 - 0.1	4.2E-01	2.4E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	2.9E-02 J	5.4E-02	MG/KG	CBD-S02-SS01-1012	5/5	0.047 - 0.05	5.4E-02	1.4E-01	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-28-0	Thallium	6.7E-02	1.6E-01	MG/KG	CBD-S02-SS03-1012	5/5	0.047 - 0.05	1.6E-01	3.3E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	1.5E+01	2.9E+01	MG/KG	CBD-S02-SS03-1012	5/5	0.47 - 0.5	2.9E+01	4.3E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	2.2E+01	2.2E+01	MG/KG	CBD-S02-SS03-1012	1/5	4.6 - 5	2.2E+01	6.6E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 2 Surface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online:
www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for Mercury Chloride (and other Mercury salts) used as surrogate for mercury.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
K = Biased High
L = Biased Low
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level

TABLE 2.1a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 2 - Surface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)								
Chromium (hexavalent)	1 / 1	2.3E+00	CBD-S02-SS01-1012	2.3E+02	3.0E-01	0.01	8E-06	None Reported
Cumulative Corresponding Hazard Index[c]						**0.01**		
Cumulative Corresponding Cancer Risk[d]							**8E-06**	

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

RSL = Regional Screening Levels

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 2

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Subsurface Soil Site 2	78-93-3	2-Butanone	2.3E-03 J	3.6E-03 J	MG/KG	CBD-S02-SB02-2426	2/5	0.0096 - 0.013	3.6E-03	N/A	2.7E+03 n	1.2E-01	SSL	NO	BSL
	67-64-1	Acetone	1.8E-02	2.6E-02 J	MG/KG	CBD-S02-SB03-2830	2/5	0.014 - 0.019	2.6E-02	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	108-88-3	Toluene	2.2E-04 J	2.2E-04 J	MG/KG	CBD-S02-SB01-2628	1/5	0.0019 - 0.0026	2.2E-04	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	131-11-3	Dimethyl phthalate	2.1E-03 J	2.1E-03 J	MG/KG	CBD-S02-SB02-2426	1/5	0.018 - 0.02	2.1E-03	N/A	N/A	NA	N/A	NO	NTX
	7429-90-5	Aluminum	2.0E+03	2.7E+03	MG/KG	CBD-S02-SB01-2628	5/5	9.1 - 10	2.7E+03	2.5E+04	7.7E+03 n	3.0E+03	SSL	NO	BSL
	7440-36-0	Antimony	1.1E-01	2.3E-01	MG/KG	CBD-S02-SB02-2426	5/5	0.094 - 0.1	2.3E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	1.4E+00	2.8E+00 J	MG/KG	CBD-S02-SB01P-2628	5/5	0.1 - 0.1	2.8E+00	1.1E+01	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	4.9E+00	1.5E+01 J	MG/KG	CBD-S02-SB01-2628	5/5	0.91 - 1	1.5E+01	6.8E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	2.2E-01	4.9E-01	MG/KG	CBD-S02-SB01-2628	5/5	0.1 - 0.1	4.9E-01	1.0E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	2.8E-02 J	8.9E-02	MG/KG	CBD-S02-SB04-2628	5/5	0.05 - 0.05	8.9E-02	1.9E-01	7.1E+00 n	6.9E-02	SSL	NO	BSL
	18540-29-9	**Chromium (hexavalent)**	**1.1E+00**	**1.1E+00**	**MG/KG**	**CBD-S02-SB01-2628**	**1/1**	**0.47 - 0.51**	**1.1E+00**	**N/A**	**3.0E-01 c**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	7.2E+00	1.1E+01	MG/KG	CBD-S02-SB01P-2628 : CBD-S02-SB05-2729	5/5	0.1 - 0.5	1.1E+01	3.9E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	4.3E-01	1.0E+00	MG/KG	CBD-S02-SB02-2426	5/5	0.1 - 0.1	1.0E+00	6.8E+00	2.3E+00 n	2.7E-02	SSL	NO	BSL
	7440-50-8	Copper	1.0E+00	2.2E+00	MG/KG	CBD-S02-SB01P-2628 : CBD-S02-SB05-2729	5/5	0.1 - 0.1	2.2E+00	1.0E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	7439-89-6	Iron	3.2E+03	1.6E+04 J	MG/KG	CBD-S02-SB01P-2628	5/5	4.6 - 5	1.6E+04	3.5E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	1.5E+00	2.6E+00	MG/KG	CBD-S02-SB01-2628	5/5	0.1 - 0.1	2.6E+00	1.4E+01	4.0E+02 n		N/A	NO	BSL
	7439-95-4	Magnesium	4.8E+02	5.7E+02 J	MG/KG	CBD-S02-SB01-2628	5/5	46 - 50	5.7E+02	2.3E+03	NUT	N/A	N/A	NO	NUT
	7439-96-5	Manganese	4.6E+00	1.4E+01	MG/KG	CBD-S02-SB01P-2628 : CBD-S02-SB05-2729	5/5	0.91 - 1	1.4E+01	5.5E+02	1.8E+02 n	2.8E+00	SSL	NO	BSL
	7440-02-0	Nickel	1.3E+00	3.2E+00	MG/KG	CBD-S02-SB04-2628	5/5	0.1 - 0.1	3.2E+00	1.1E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	3.7E+02	4.7E+02	MG/KG	CBD-S02-SB05-2729	5/5	46 - 50	4.7E+02	1.6E+03	NUT	N/A	N/A	NO	NUT
	7782-49-2	Selenium	1.3E-01	1.7E-01	MG/KG	CBD-S02-SB02-2426	3/5	0.1 - 0.1	1.7E-01	2.5E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	2.5E-02 J	2.9E-02 J	MG/KG	CBD-S02-SB02-2426	2/5	0.05 - 0.05	2.9E-02	5.1E-02	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-28-0	Thallium	7.6E-02	1.2E-01	MG/KG	CBD-S02-SB05-2729	5/5	0.05 - 0.05	1.2E-01	4.7E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	3.2E+00	1.6E+01 J	MG/KG	CBD-S02-SB01P-2628	5/5	0.1 - 0.5	1.6E+01	3.8E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 2 Suburface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online:
www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level

TABLE 2.2a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 2 - Subsurface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)								
Chromium (hexavalent)	1 / 1	1.1E+00	CBD-S02-SB01-2628	2.3E+02	3.0E-01	0.005	4E-06	None Reported
Cumulative Corresponding Hazard Index[c]						**0.005**		
Cumulative Corresponding Cancer Risk[d]							**4E-06**	

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

RSL = Regional Screening Levels

TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 2
Site Investigation Report
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Groundwater Site 2	7429-90-5	Aluminum	6.5E+02	6.5E+02	UG/L	CBD-S02-GW01-1012	1/1	100 - 100	6.5E+02	N/A	2.0E+03	n	50 - 200	SMCL	NO	BSL
	7440-36-0	Antimony	2.6E-01 J	2.6E-01 J	UG/L	CBD-S02-GW01-1012	1/1	1 - 1	2.6E-01	N/A	7.8E-01	n	6	MCL	NO	BSL
	7440-38-2	**Arsenic**	**1.2E+00**	**1.2E+00**	**UG/L**	**CBD-S02-GW01-1012**	**1/1**	**1 - 1**	**1.2E+00**	**N/A**	**5.2E-02**	**c**	**10**	**MCL**	**YES**	**ASL**
	7440-39-3	Barium	1.0E+02	1.0E+02	UG/L	CBD-S02-GW01-1012	1/1	10 - 10	1.0E+02	N/A	3.8E+02	n	2000	MCL	NO	BSL
	7440-43-9	Cadmium	2.7E-01	2.7E-01	UG/L	CBD-S02-GW01-1012	1/1	0.2 - 0.2	2.7E-01	N/A	9.2E-01	n	5	MCL	NO	BSL
	7440-70-2	Calcium	2.1E+04	2.1E+04	UG/L	CBD-S02-GW01-1012	1/1	500 - 500	2.1E+04	N/A	NUT		N/A	N/A	NO	NUT
	7440-47-3	Chromium	6.0E+00	6.0E+00	UG/L	CBD-S02-GW01-1012	1/1	1 - 1	6.0E+00	N/A	2.2E+03	n	100	MCL	NO	BSL
	7440-48-4	**Cobalt**	**8.2E+00**	**8.2E+00**	**UG/L**	**CBD-S02-GW01-1012**	**1/1**	**1 - 1**	**8.2E+00**	**N/A**	**6.0E-01**	**n**	**N/A**	**N/A**	**YES**	**ASL**
	7439-89-6	**Iron**	**3.1E+03**	**3.1E+03**	**UG/L**	**CBD-S02-GW01-1012**	**1/1**	**10 - 10**	**3.1E+03**	**N/A**	**1.4E+03**	**n**	**300**	**SMCL**	**YES**	**ASL**
	7439-95-4	Magnesium	5.4E+03	5.4E+03	UG/L	CBD-S02-GW01-1012	1/1	500 - 500	5.4E+03	N/A	NUT		N/A	N/A	NO	NUT
	7439-96-5	**Manganese**	**1.8E+02**	**1.8E+02**	**UG/L**	**CBD-S02-GW01-1012**	**1/1**	**10 - 10**	**1.8E+02**	**N/A**	**4.3E+01**	**n**	**50**	**SMCL**	**YES**	**ASL**
	7440-02-0	Nickel	2.4E+01	2.4E+01	UG/L	CBD-S02-GW01-1012	1/1	1 - 1	2.4E+01	N/A	3.9E+01	n	N/A	N/A	NO	BSL
	7440-09-7	Potassium	8.0E+03	8.0E+03	UG/L	CBD-S02-GW01-1012	1/1	100 - 100	8.0E+03	N/A	NUT		N/A	N/A	NO	NUT
	7782-49-2	Selenium	2.1E+00	2.1E+00	UG/L	CBD-S02-GW01-1012	1/1	1 - 1	2.1E+00	N/A	1.0E+01	n	50	MCL	NO	BSL
	7440-23-5	Sodium	7.2E+03	7.2E+03	UG/L	CBD-S02-GW01-1012	1/1	500 - 500	7.2E+03	N/A	NUT		N/A	N/A	NO	NUT
	7440-28-0	**Thallium**	**3.0E-01 J**	**3.0E-01 J**	**UG/L**	**CBD-S02-GW01-1012**	**1/1**	**1 - 1**	**3.0E-01**	**N/A**	**2.0E-02**	**n**	**2**	**MCL**	**YES**	**ASL**
	7440-62-2	Vanadium	2.6E+00	2.6E+00	UG/L	CBD-S02-GW01-1012	1/1	1 - 1	2.6E+00	N/A	8.6E+00	n	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations. Total metals used in evaluation.
[2] Maximum concentration is used for screening.
[3] Background not available.
[4] Oak Ridge National Laboratory (ORNL). November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). [Online]. Available: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Chromium(III) used as surrogate for chromium.
[5] Drinking water Maximum Contaminant Level (MCL) (USEPA, 2011).
[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)

c = carcinogenic
COPC = Chemical of Potential Concern
J = Estimated Value
MCL = Maximum Contaminant Level
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Levels
SMCL = Maximum Contaminant Level, Secondary Drinking Water Standards
µg/L = microgram per Liter

TABLE 2.3a

Step 2 Groundwater Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 2 - Groundwater

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Tap Water RSL HQ=1	Carcinogenic Tap Water RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (µg/L)								
Arsenic	1 / 1	1.2E+00	CBD-S02-GW01-1012	6.0E+00	5.2E-02	0.2	2E-05	Skin, Vascular
Cobalt	1 / 1	8.2E+00	CBD-S02-GW01-1012	6.0E+00	NA	1	NA	Thyroid
Iron	1 / 1	3.1E+03	CBD-S02-GW01-1012	1.4E+04	NA	0.2	NA	Gastrointestinal System
Manganese	1 / 1	1.8E+02	CBD-S02-GW01-1012	4.3E+02	NA	0.4	NA	Nervous System
Thallium	1 / 1	3.0E-01 J	CBD-S02-GW01-1012	2.0E-01	NA	2	NA	Hair
Cumulative Corresponding Hazard Index[c]						**4**		
Cumulative Corresponding Cancer Risk[d]							**2E-05**	

Total Nervous System HI =	0.4
Total Thyroid HI =	1
Total Gastrointestinal System HI =	0.2
Total Hair HI =	2
Total Skin HI =	0.2
Total Vascular HI =	0.2

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1×10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

µg/L = micrograms per liter

NA = Not available/not applicable

RSL = Regional Screening Levels

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 3

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Surface Soil Site 3	108-10-1	4-Methyl-2-pentanone	3.0E-03 J	3.0E-03 J	MG/KG	CBD-S03-SS03-1012	1/5	0.0084 - 0.011	3.0E-03	N/A	3.3E+03 n	1.4E-01	SSL	NO	BSL
	67-64-1	Acetone	6.5E-02 J	6.5E-02 J	MG/KG	CBD-S03-SS05-1012	1/5	0.013 - 0.017	6.5E-02	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	67-66-3	Chloroform	1.4E-04 J	1.4E-04 J	MG/KG	CBD-S03-SS05-1012	1/5	0.00084 - 0.0011	1.4E-04	N/A	3.2E-01 c	6.1E-05	SSL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	2.8E-04 J	2.8E-04 J	MG/KG	CBD-S03-SS03-1012	1/5	0.0017 - 0.0022	2.8E-04	N/A	2.3E+03 ns	3.3E-01	SSL	NO	BSL
	83-32-9	Acenaphthene	1.5E-03 J	1.5E-03 J	MG/KG	CBD-S03-SS04-1012	1/5	0.018 - 0.018	1.5E-03	N/A	3.6E+02 n	5.5E-01	SSL	NO	BSL
	50-32-8	**Benzo(a)pyrene**	**4.0E-02**	**4.8E-02**	**MG/KG**	**CBD-S03-SS04-1012**	**2/5**	**0.0088 - 0.022**	**4.8E-02**	**N/A**	**1.6E-02 c**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	Benzo(b)fluoranthene	1.2E-01	1.2E-01	MG/KG	CBD-S03-SS04-1012	1/5	0.018 - 0.018	1.2E-01	N/A	1.6E-01 c	4.1E-02	SSL	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	4.2E-02	4.2E-02	MG/KG	CBD-S03-SS04-1012	1/5	0.036 - 0.037	4.2E-02	N/A	1.8E+02 n	N/A	N/A	NO	BSL
	207-08-9	Benzo(k)fluoranthene	5.8E-02	5.8E-02	MG/KG	CBD-S03-SS04-1012	1/5	0.018 - 0.018	5.8E-02	N/A	1.6E+00 c	4.0E-01	SSL	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	4.5E-03 J	7.4E-03 J	MG/KG	CBD-S03-SS04-1012	2/5	0.0088 - 0.022	7.4E-03	N/A	1.6E-02 c	1.3E-02	SSL	NO	BSL
	206-44-0	Fluoranthene	3.9E-02	3.9E-02	MG/KG	CBD-S03-SS04-1012	1/5	0.018 - 0.018	3.9E-02	N/A	2.4E+02 n	8.9E+00	SSL	NO	BSL
	86-73-7	Fluorene	1.1E-03 J	1.1E-03 J	MG/KG	CBD-S03-SS04-1012	1/5	0.036 - 0.037	1.1E-03	N/A	2.4E+02 n	5.4E-01	SSL	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	3.7E-02	3.7E-02	MG/KG	CBD-S03-SS04-1012	1/5	0.036 - 0.037	3.7E-02	N/A	1.6E-01 c	1.3E-01	SSL	NO	BSL
	85-01-8	Phenanthrene	2.1E-02	2.1E-02	MG/KG	CBD-S03-SS04-1012	1/5	0.018 - 0.018	2.1E-02	N/A	1.8E+03 n	N/A	N/A	NO	BSL
	129-00-0	Pyrene	6.8E-02	6.8E-02	MG/KG	CBD-S03-SS04-1012	1/5	0.018 - 0.018	6.8E-02	N/A	1.8E+02 n	1.3E+00	SSL	NO	BSL
	11096-82-5	**Aroclor-1260**	**4.1E-02**	**5.5E+00**	**MG/KG**	**CBD-S03-SS03-1012**	**5/5**	**0.018 - 0.37**	**5.5E+00**	**N/A**	**2.4E-01 c**	**5.5E-03**	**SSL**	**YES**	**ASL**
	7429-90-5	Aluminum	4.5E+03	7.9E+03	MG/KG	CBD-S03-SS05-1012	5/5	10 - 10	7.9E+03	9.3E+03	7.7E+03 n	3.0E+03	SSL	NO	BBK
	7440-36-0	Antimony	8.0E-02 J	9.0E-01	MG/KG	CBD-S03-SS03-1012	5/5	0.093 - 0.1	9.0E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	**Arsenic**	**1.2E+00**	**1.4E+01**	**MG/KG**	**CBD-S03-SS03-1012**	**5/5**	**0.092 - 0.5**	**1.4E+01**	**6.2E+00**	**6.8E-01 c**	**1.5E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	9.8E+00	4.4E+01	MG/KG	CBD-S03-SS05-1012	5/5	1 - 1	4.4E+01	1.1E+02	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	2.6E-01	6.4E-01	MG/KG	CBD-S03-SS05-1012	5/5	0.092 - 0.1	6.4E-01	1.0E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	5.5E-02	1.7E-01	MG/KG	CBD-S03-SS05-1012	5/5	0.046 - 0.05	1.7E-01	1.1E+00	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	1.8E+02	4.1E+03	MG/KG	CBD-S03-SS01-1012	5/5	50 - 50	4.1E+03	3.6E+03	NUT	NUT	N/A	NO	NUT
	18540-29-9	Chromium (hexavalent)	1.5E-01 J	1.5E-01 J	MG/KG	CBD-S03-SS01-1012	1/1	0.43 - 0.43	1.5E-01	N/A	3.0E-01 c	6.7E-04	SSL	NO	BSL
	7440-47-3	Chromium	6.2E+00	1.2E+01	MG/KG	CBD-S03-SS03-1012	5/5	0.092 - 0.5	1.2E+01	2.7E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	1.4E+00	3.4E+00	MG/KG	CBD-S03-SS05-1012	5/5	0.092 - 0.1	3.4E+00	5.4E+00	2.3E+00 n	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	1.9E+00	3.9E+00	MG/KG	CBD-S03-SS03-1012	5/5	0.092 - 0.1	3.9E+00	4.4E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	57-12-5	Cyanide	4.3E-02 J	4.3E-02 J	MG/KG	CBD-S03-SS05-1012	1/5	0.11 - 0.11	4.3E-02	NA	2.7E-01 n	1.5E-03	SSL	NO	BSL
	7439-89-6	Iron	5.6E+03	8.4E+03	MG/KG	CBD-S03-SS04-1012	5/5	5 - 5	8.4E+03	1.7E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	2.9E+00	1.1E+01	MG/KG	CBD-S03-SS04-1012	5/5	0.092 - 0.5	1.1E+01	9.6E+01	4.0E+02 n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	4.8E+02	1.4E+03	MG/KG	CBD-S03-SS01-1012	5/5	50 - 50	1.4E+03	1.8E+03	NUT	NUT	N/A	NO	NUT
	7439-96-5	Manganese	2.0E+01	1.6E+02	MG/KG	CBD-S03-SS01-1012	5/5	1 - 1	1.6E+02	2.1E+02	1.8E+02 n	2.8E+00	SSL	NO	BBK
	7439-97-6	Mercury	7.8E-03 J	1.2E-02 J	MG/KG	CBD-S03-SS01-1012	4/5	0.05 - 0.05	1.2E-02	9.9E-01	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	2.3E+00	1.0E+01	MG/KG	CBD-S03-SS01-1012	5/5	0.1 - 0.46	1.0E+01	1.5E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	2.5E+02	4.0E+02	MG/KG	CBD-S03-SS02-1012	5/5	50 - 50	4.0E+02	9.9E+02	NUT	NUT	N/A	NO	NUT
	7782-49-2	Selenium	2.5E-01	9.6E-01	MG/KG	CBD-S03-SS03-1012	4/5	0.092 - 0.1	9.6E-01	2.8E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	2.4E-02 J	3.4E-02 J	MG/KG	CBD-S03-SS04-1012	5/5	0.046 - 0.05	3.4E-02	8.7E+00	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-23-5	Sodium	2.0E+02	2.0E+02	MG/KG	CBD-S03-SS01-1012	1/5	50 - 50	2.0E+02	N/A	NUT	NUT	N/A	NO	NUT

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 3

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
	7440-28-0	Thallium	8.0E-02	2.4E-01	MG/KG	CBD-S03-SS05-1012	5/5	0.046 - 0.05	2.4E-01	4.4E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	8.2E+00	1.8E+01	MG/KG	CBD-S03-SS03-1012	5/5	0.092 - 0.5	1.8E+01	2.6E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	3.0E+01	4.5E+01	MG/KG	CBD-S03-SS05-1012	3/5	1 - 10	4.5E+01	1.4E+02	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 3 Surface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for Mercury Chloride (and other Mercury salts) used as surrogate for mercury.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level
ns = noncarcinogenic screening level may exceed Csat (soil saturation concentration)

TABLE 2.1a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 3 - Surface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Semivolatile Organic Compounds (mg/kg)								
Benzo(a)pyrene	2 / 5	4.8E-02	CBD-S03-SS04-1012	NA	1.6E-02	NA	3E-06	NA
PCBs (mg/kg)								
Aroclor-1260	5 / 5	5.5E+00	CBD-S03-SS03-1012	NA	2.4E-01	NA	2E-05	NA
Metals (mg/kg)								
Arsenic	5 / 5	1.4E+01	CBD-S03-SS03-1012	3.5E+01	6.8E-01	0.4	2E-05	Skin, Vascular
Cumulative Corresponding Hazard Index[c]						**0.4**		
Cumulative Corresponding Cancer Risk[d]							**5E-05**	
							Total Skin System HI =	0.4
							Total Vascular System HI =	0.4

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

Table 2.1b

Step 3 Soil Screening - Risk Ratio, 95% UCL

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 3 - Surface Soil

Analyte	Detection Frequency	95% UCL		95% UCL Rationale	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Semivolatile Organic Compounds (mg/kg)									
Benzo(a)pyrene	2 / 5	4.6E-02	95% KM-t	1	NA	1.6E-02	NA	3E-06	NA
PCBs (mg/kg)									
Aroclor-1260	5 / 5	5.5E+00	Max	2	NA	2.4E-01	NA	2E-05	NA
Metals (mg/kg)									
Arsenic	5 / 5	1.4E+01	Max	2	3.5E+01	6.8E-01	0.4	2E-05	Skin, Vascular
Cumulative Corresponding Hazard Index[c]							**0.4**		
Cumulative Corresponding Cancer Risk[d]								**5E-05**	

Total Skin System HI =	0.4
Total Vascular System HI =	0.4

[a] Corresponding Hazard Index equals 95% UCL divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10-6 divided by the carcinogenic RSL .

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,

Constituents selected as COPCs are indicated by shading.

mg/kg = milligrams per kilogram

HI = Hazard Index

NA = Not available/not applicable

RSL = Regional Screening Levels

UCL = Upper Confidence Limit

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations

in users guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Adjusted Gamma UCL (95% Adj-Gamma).

UCL Rationale:

(1) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

(2) Maximum value used because calculated 95% UCL exceeds maximum concentration.

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 3

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Subsurface Soil Site 3	71-43-2	Benzene	3.8E-04 J	3.8E-04 J	MG/KG	CBD-S03-SB04-1820	1/5	0.00093 - 0.0018	3.8E-04	N/A	1.2E+00 c	2.3E-04	SSL	NO	BSL
	100-41-4	Ethylbenzene	2.2E-04 J	2.2E-04 J	MG/KG	CBD-S03-SB04-1820	1/5	0.00093 - 0.0018	2.2E-04	N/A	5.8E+00 c	1.7E-03	SSL	NO	BSL
	m&pXYLENE	m- and p-Xylene	4.3E-04 J	4.3E-04 J	MG/KG	CBD-S03-SB04-1820	1/5	0.0019 - 0.0036	4.3E-04	N/A	5.8E+01 n	1.9E-02	SSL	NO	BSL
	108-87-2	Methylcyclohexane	1.8E-04 J	1.8E-04 J	MG/KG	CBD-S03-SB04-1820	1/5	0.0047 - 0.009	1.8E-04	N/A	6.1E+01 n	N/A	N/A	NO	BSL
	75-09-2	Methylene chloride	1.8E-02	1.8E-02	MG/KG	CBD-S03-SB05-1315	1/5	0.014 - 0.027	1.8E-02	N/A	3.5E+01 n	2.7E-03	SSL	NO	BSL
	108-88-3	Toluene	1.1E-03 J	1.1E-03 J	MG/KG	CBD-S03-SB04-1820	1/5	0.0019 - 0.0036	1.1E-03	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-1	1.5E-03 J	1.5E-03 J	MG/KG	CBD-S03-SB02-2022	1/5	0.0019 - 0.0036	1.5E-03	N/A	2.3E+03 ns	3.3E-01	SSL	NO	BSL
	11096-82-5	Aroclor-1260	1.7E-02 J	8.1E-02	MG/KG	CBD-S03-SB03-2022	2/5	0.019 - 0.029	8.1E-02	N/A	2.4E-01 c	5.5E-03	SSL	NO	BSL
	7429-90-5	Aluminum	1.6E+03	6.1E+03	MG/KG	CBD-S03-SB04-1820	5/5	10 - 10	6.1E+03	9.7E+03	7.7E+03 n	3.0E+03	SSL	NO	BSL
	7440-36-0	Antimony	7.1E-02 J	1.8E-01	MG/KG	CBD-S03-SB02-2022	5/5	0.094 - 0.1	1.8E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	1.2E+00	5.2E+00	MG/KG	CBD-S03-SB02-2022	5/5	0.1 - 0.1	5.2E+00	7.0E+00	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	4.6E+00	1.4E+01	MG/KG	CBD-S03-SB02-2022	5/5	1 - 1	1.4E+01	4.5E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.2E-01	1.1E+00	MG/KG	CBD-S03-SB03-2022	5/5	0.1 - 0.1	1.1E+00	1.1E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	1.8E-01	9.3E-01	MG/KG	CBD-S03-SB04-1820	3/5	0.05 - 0.05	9.3E-01	9.5E-01	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	3.0E+02	3.6E+04	MG/KG	CBD-S03-SB04-1820	4/5	50 - 50	3.6E+04	2.5E+03	NUT	NUT	N/A	NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**5.8E-01**	**5.8E-01**	**MG/KG**	**CBD-S03-SB01P-1315**	**1/1**	**0.45 - 0.48**	**5.8E-01**	**N/A**	**3.0E-01 c**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	8.4E+00	2.6E+01	MG/KG	CBD-S03-SB04-1820	5/5	0.1 - 0.5	2.6E+01	3.9E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	4.0E-01	5.0E+00	MG/KG	CBD-S03-SB04-1820	5/5	0.1 - 0.1	5.0E+00	7.9E+00	2.3E+00 n	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	1.1E+00	3.1E+00	MG/KG	CBD-S03-SB02-2022	5/5	0.1 - 0.1	3.1E+00	5.9E+00	3.1E+02 n	2.8E+00	SSL	NO	BSL
	7439-89-6	Iron	2.6E+03	1.8E+04	MG/KG	CBD-S03-SB02-2022	5/5	5 - 120	1.8E+04	1.9E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	1.8E+00	5.0E+00	MG/KG	CBD-S03-SB02-2022	5/5	0.1 - 0.1	5.0E+00	1.3E+01	4.0E+02 n	NA	N/A	NO	BSL
	7439-95-4	Magnesium	4.6E+02	1.9E+04	MG/KG	CBD-S03-SB04-1820	5/5	50 - 50	1.9E+04	2.8E+03	NUT	NUT	N/A	NO	NUT
	7439-96-5	**Manganese**	**4.0E+00**	**3.2E+02**	**MG/KG**	**CBD-S03-SB04-1820**	**5/5**	**1 - 1**	**3.2E+02**	**8.0E+01**	**1.8E+02 n**	**2.8E+00**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	1.0E-02 J	1.0E-02 J	MG/KG	CBD-S03-SB01P-1315	1/5	0.046 - 0.05	1.0E-02	3.8E-02	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	6.7E-01	1.8E+01	MG/KG	CBD-S03-SB04-1820	5/5	0.1 - 0.5	1.8E+01	1.6E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	3.3E+02	1.8E+03	MG/KG	CBD-S03-SB04-1820	5/5	50 - 50	1.8E+03	1.6E+03	NUT	NUT	N/A	NO	NUT
	7782-49-2	Selenium	3.9E-01	1.4E+00	MG/KG	CBD-S03-SB02-2022	4/5	0.1 - 0.1	1.4E+00	2.8E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	3.5E-02 J	7.2E-02	MG/KG	CBD-S03-SB04-1820	5/5	0.05 - 0.05	7.2E-02	2.1E-01	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-23-5	Sodium	2.0E+02	2.0E+02	MG/KG	CBD-S03-SB04-1820	1/5	50 - 50	2.0E+02	N/A	NUT	NUT	N/A	NO	NUT
	7440-28-0	Thallium	1.1E-01	3.2E-01	MG/KG	CBD-S03-SB02-2022	5/5	0.05 - 0.05	3.2E-01	3.2E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	5.2E+00	1.4E+01	MG/KG	CBD-S03-SB02-2022	5/5	0.1 - 0.5	1.4E+01	2.1E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	7.5E+00	5.4E+01	MG/KG	CBD-S03-SB02-2022	5/5	1 - 10	5.4E+01	4.3E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 3

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 3 Subsurface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential
Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for xylene, mixtures used as surrogate for m- and p-xylenes.
RSL value for n-Hexane used as surrogate for methylcyclohexane.
RSL value for Chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for Mercury Chloride (and other Mercury salts) used as surrogate for mercury.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level
ns = noncarcinogenic screening level may exceed Csat (soil saturation concentration)

TABLE 2.2a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 3 - Subsurface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)								
Chromium (hexavalent)	1 / 1	5.8E-01	CBD-S03-SB01P-1315	2.3E+02	0.3	0.003	2E-06	None Reported
Manganese	5 / 5	3.2E+02	CBD-S03-SB04-1820	1.8E+03	NA	0.2	NA	Neurological
Cumulative Corresponding Hazard Index[c]						**0.2**		
Cumulative Corresponding Cancer Risk[d]							**2E-06**	
						Total Neurological HI =		0.2

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 4

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Surface Soil Site 4	67-64-1	Acetone	2.2E-02 J	1.0E-01	MG/KG	CBD-S04-SS03-1012 : CBD-S04-SS05-1012	6/6	0.012 - 0.017	1.0E-01	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	71-43-2	Benzene	1.8E-04 J	1.8E-04 J	MG/KG	CBD-S04-SS03-1012	1/6	0.00083 - 0.0011	1.8E-04	N/A	1.2E+00 c	2.3E-04	SSL	NO	BSL
	108-88-3	Toluene	2.0E-04 J	2.0E-04 J	MG/KG	CBD-S04-SS03-1012	1/6	0.0017 - 0.0023	2.0E-04	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	2.6E-04 J	2.6E-04 J	MG/KG	CBD-S04-SS01-1012	1/6	0.0017 - 0.0023	2.6E-04	N/A	2.3E+03 ns	3.3E-01	SSL	NO	BSL
	92-52-4	1,1-Biphenyl	1.3E-02 J	1.3E-02 J	MG/KG	CBD-S04-SS03-1012	1/6	0.018 - 0.019	1.3E-02	N/A	4.7E+00 n	8.7E-04	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	3.2E-02	3.2E-02	MG/KG	CBD-S04-SS03-1012	1/6	0.018 - 0.019	3.2E-02	N/A	2.4E+01 n	1.9E-02	SSL	NO	BSL
	534-52-1	4,6-Dinitro-2-methylphenol	2.3E-02 J	2.3E-02 J	MG/KG	CBD-S04-SS02-1012	1/6	0.18 - 0.19	2.3E-02	N/A	5.1E-01 n	2.6E-04	SSL	NO	BSL
	83-32-9	Acenaphthene	5.6E-03 J	3.1E-01	MG/KG	CBD-S04-SS03-1012	3/6	0.018 - 0.019	3.1E-01	N/A	3.6E+02 n	5.5E-01	SSL	NO	BSL
	208-96-8	Acenaphthylene	3.4E-03 J	3.4E-03 J	MG/KG	CBD-S04-SS03-1012	1/6	0.018 - 0.019	3.4E-03	N/A	3.6E+02 n	N/A	N/A	NO	BSL
	120-12-7	Anthracene	1.3E-02 J	5.8E-01	MG/KG	CBD-S04-SS03-1012	3/6	0.018 - 0.019	5.8E-01	N/A	1.8E+03 n	5.8E+00	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**1.9E-03 J**	**3.1E+00**	**MG/KG**	**CBD-S04-SS03-1012**	**4/6**	**0.018 - 0.18**	**3.1E+00**	**N/A**	**1.6E-01 c**	**4.2E-03**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**7.1E-02**	**3.5E+00**	**MG/KG**	**CBD-S04-SS03-1012**	**3/6**	**0.0023 - 0.44**	**3.5E+00**	**N/A**	**1.6E-02 c**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**8.0E-02**	**3.9E+00**	**MG/KG**	**CBD-S04-SS03-1012**	**3/6**	**0.018 - 0.18**	**3.9E+00**	**N/A**	**1.6E-01 c**	**4.1E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	1.2E-03 J	8.0E-01	MG/KG	CBD-S04-SS03-1012	4/6	0.035 - 0.038	8.0E-01	N/A	1.8E+02 n	N/A	N/A	NO	BSL
	207-08-9	Benzo(k)fluoranthene	4.1E-02	7.3E-01	MG/KG	CBD-S04-SS03-1012	3/6	0.018 - 0.019	7.3E-01	N/A	1.6E+00 c	4.0E-01	SSL	NO	BSL
	86-74-8	Carbazole	3.8E-01	3.8E-01	MG/KG	CBD-S04-SS03-1012	1/6	0.18 - 0.19	3.8E-01	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	1.5E-03 J	2.6E+00	MG/KG	CBD-S04-SS03-1012	4/6	0.018 - 0.18	2.6E+00	N/A	1.6E+01 c	1.2E+00	SSL	NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**5.4E-03 J**	**2.3E-01 J**	**MG/KG**	**CBD-S04-SS03-1012**	**3/6**	**0.0023 - 0.44**	**2.3E-01**	**N/A**	**1.6E-02 c**	**1.3E-02**	**SSL**	**YES**	**ASL**
	132-64-9	Dibenzofuran	2.2E-03 J	1.7E-01	MG/KG	CBD-S04-SS03-1012	3/6	0.018 - 0.019	1.7E-01	N/A	7.3E+00 n	1.5E-02	SSL	NO	BSL
	131-11-3	Dimethyl phthalate	2.3E-03 J	2.3E-03 J	MG/KG	CBD-S04-SS02-1012	1/6	0.018 - 0.019	2.3E-03	N/A	N/A	NA	N/A	NO	NTX
	206-44-0	Fluoranthene	1.2E-03 J	4.8E+00	MG/KG	CBD-S04-SS03-1012	5/6	0.018 - 0.18	4.8E+00	N/A	2.4E+02 n	8.9E+00	SSL	NO	BSL
	86-73-7	Fluorene	3.2E-03 J	2.1E-01	MG/KG	CBD-S04-SS03-1012	3/6	0.035 - 0.038	2.1E-01	N/A	2.4E+02 n	5.4E-01	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**2.8E-02 J**	**8.3E-01**	**MG/KG**	**CBD-S04-SS03-1012**	**3/6**	**0.035 - 0.038**	**8.3E-01**	**N/A**	**1.6E-01 c**	**1.3E-01**	**SSL**	**YES**	**ASL**
	91-20-3	Naphthalene	1.1E-03 J	8.4E-02	MG/KG	CBD-S04-SS03-1012	3/6	0.018 - 0.019	8.4E-02	N/A	3.8E+00 c	5.4E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	1.2E-03 J	3.5E+00	MG/KG	CBD-S04-SS03-1012	5/6	0.018 - 0.18	3.5E+00	N/A	1.8E+03 n	N/A	N/A	NO	BSL
	129-00-0	Pyrene	2.3E-03 J	4.5E+00	MG/KG	CBD-S04-SS03-1012	4/6	0.018 - 0.18	4.5E+00	N/A	1.8E+02 n	1.3E+00	SSL	NO	BSL
	11096-82-5	**Aroclor-1260**	**7.2E-03 J**	**2.6E-01**	**MG/KG**	**CBD-S04-SS03-1012**	**4/6**	**0.018 - 0.019**	**2.6E-01**	**N/A**	**2.4E-01 c**	**5.5E-03**	**SSL**	**YES**	**ASL**
	7429-90-5	Aluminum	4.4E+03	1.5E+04	MG/KG	CBD-S04-SS05-1012	6/6	9.4 - 250	1.5E+04	1.7E+04	7.7E+03 n	3.0E+03	SSL	NO	BBK
	7440-36-0	Antimony	1.6E-01	2.1E+00	MG/KG	CBD-S04-SS04-1012	6/6	0.094 - 0.1	2.1E+00	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	2.2E+00	5.2E+00	MG/KG	CBD-S04-SS01-1012	6/6	0.093 - 0.1	5.2E+00	1.0E+01	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	1.2E+01	4.3E+01	MG/KG	CBD-S04-SS05-1012	6/6	0.94 - 1	4.3E+01	6.7E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	2.9E-01	5.8E-01	MG/KG	CBD-S04-SS05-1012	6/6	0.093 - 0.1	5.8E-01	7.6E-01	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	4.4E-02 J	2.9E-01	MG/KG	CBD-S04-SS06-1012	6/6	0.047 - 0.05	2.9E-01	1.6E+00	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	2.1E+02	7.5E+02	MG/KG	CBD-S04-SS06-1012	6/6	47 - 50	7.5E+02	3.0E+03	NUT	NUT	N/A	NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**3.5E-01 J**	**3.5E-01 J**	**MG/KG**	**CBD-S04-SS01P-1012**	**1/1**	**0.45 - 0.45**	**3.5E-01**	**N/A**	**3.0E-01 c**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	7.8E+00	2.0E+01	MG/KG	CBD-S04-SS05-1012	6/6	0.1 - 0.5	2.0E+01	4.2E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	1.2E+00	4.0E+00	MG/KG	CBD-S04-SS05-1012	6/6	0.093 - 0.1	4.0E+00	4.8E+00	2.3E+00 n	2.7E-02	SSL	NO	BBK

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 4

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
	7440-50-8	Copper	3.0E+00	1.4E+01	MG/KG	CBD-S04-SS06-1012	6/6	0.093 - 0.5	1.4E+01	2.1E+01	3.1E+02	n	2.8E+00	SSL	NO	BSL
	57-12-5	Cyanide	2.6E-02 J	2.6E-02 J	MG/KG	CBD-S04-SS06-1012	1/6	0.11 - 0.11	2.6E-02	N/A	2.7E-01	n	1.5E-03	SSL	NO	BSL
	7439-89-6	Iron	7.6E+03	2.1E+04	MG/KG	CBD-S04-SS05-1012	6/6	4.7 - 120	2.1E+04	7.1E+04	5.5E+03	n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	5.8E+00	5.9E+01	MG/KG	CBD-S04-SS04-1012	6/6	0.093 - 1	5.9E+01	6.2E+01	4.0E+02	n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	4.9E+02	1.4E+03	MG/KG	CBD-S04-SS05-1012	6/6	47 - 50	1.4E+03	1.2E+03	NUT		NUT	N/A	NO	NUT
	7439-96-5	Manganese	2.5E+01	1.2E+02	MG/KG	CBD-S04-SS05-1012	6/6	0.94 - 1	1.2E+02	3.3E+02	1.8E+02	n	2.8E+00	SSL	NO	BSL
	7439-97-6	Mercury	6.4E-03 J	8.4E-02	MG/KG	CBD-S04-SS04-1012	5/6	0.05 - 0.05	8.4E-02	1.1E-01	2.3E+00	n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	2.6E+00	7.7E+00	MG/KG	CBD-S04-SS05-1012	6/6	0.093 - 0.1	7.7E+00	1.0E+01	1.5E+02	n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	3.5E+02	9.3E+02	MG/KG	CBD-S04-SS01P-1012	6/6	47 - 50	9.3E+02	1.3E+03	NUT		NUT	N/A	NO	NUT
	7782-49-2	Selenium	2.2E-01	4.1E-01	MG/KG	CBD-S04-SS01-1012	6/6	0.093 - 0.1	4.1E-01	2.4E+00	3.9E+01	n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	3.3E-02 J	9.4E-01	MG/KG	CBD-S04-SS04-1012	6/6	0.047 - 0.05	9.4E-01	1.4E-01	3.9E+01	n	8.0E-02	SSL	NO	BSL
	7440-28-0	Thallium	1.2E-01	2.7E-01	MG/KG	CBD-S04-SS05-1012	6/6	0.047 - 0.05	2.7E-01	3.3E-01	7.8E-02	n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	1.4E+01	3.1E+01	MG/KG	CBD-S04-SS05-1012	6/6	0.47 - 0.5	3.1E+01	4.3E+01	3.9E+01	n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	3.2E+01	6.6E+01	MG/KG	CBD-S04-SS04-1012	2/6	4.6 - 25	6.6E+01	6.6E+01	2.3E+03	n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 2 Surface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Acenaphthene used as surrogate for Acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for Mercury Chloride (and other Mercury salts) used as surrogate for mercury.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level
ns = noncarcinogenic screening level may exceed Csat (soil saturation concentration)

TABLE 2.1a
Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland
Site 4 - Surface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Semivolatile Organic Compounds (mg/kg)								
Benzo(a)anthracene	4 / 6	3.1E+00	CBD-S04-SS03-1012	NA	1.6E-01	NA	2E-05	NA
Benzo(a)pyrene	3 / 6	3.5E+00	CBD-S04-SS03-1012	NA	1.6E-02	NA	2E-04	NA
Benzo(b)fluoranthene	3 / 6	3.9E+00	CBD-S04-SS03-1012	NA	1.6E-01	NA	2E-05	NA
Dibenz(a,h)anthracene	3 / 6	2.3E-01 J	CBD-S04-SS03-1012	NA	1.6E-02	NA	1E-05	NA
Indeno(1,2,3-cd)pyrene	3 / 6	8.3E-01	CBD-S04-SS03-1012	NA	1.6E-01	NA	5E-06	NA
PCBs (mg/kg)								
Aroclor-1260	4 / 6	2.6E-01	CBD-S04-SS03-1012	NA	2.4E-01	NA	1E-06	NA
Metals (mg/kg)								
Chromium (hexavalent)	1 / 1	3.5E-01 J	CBD-S04-SS01P-1012	2.3E+02	3.0E-01	0.002	1E-06	None Reported
Cumulative Corresponding Hazard Index[c]						**0.002**		
Cumulative Corresponding Cancer Risk[d]							**3E-04**	

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{-6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

Table 2.1b
Step 3 Soil Screening - Risk Ratio, 95% UCL
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland
Site 4 - Surface Soil

Analyte	Detection Frequency	95% UCL		95% UCL Rationale	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Semivolatile Organic Compounds (mg/kg)									
Benzo(a)anthracene	4 / 6	1.6E+00	95% KM(t)	1, 2, 3	NA	1.6E-01	NA	1E-05	NA
Benzo(a)pyrene	3 / 6	3.5E+00	Max	6	NA	1.6E-02	NA	2E-04	NA
Benzo(b)fluoranthene	3 / 6	3.9E+00	Max	6	NA	1.6E-01	NA	2E-05	NA
Dibenz(a,h)anthracene	3 / 6	2.3E-01	Max	6	NA	1.6E-02	NA	1E-05	NA
Indeno(1,2,3-cd)pyrene	3 / 6	8.3E-01	Max	6	NA	1.6E-01	NA	5E-06	NA
PCBs (mg/kg)									
Aroclor-1260	4 / 6	1.4E-01	95% KM(t)	1, 2, 3	NA	2.4E-01	NA	6E-07	NA
Metals (mg/kg)									
Chromium (hexavalent)	1 / 1	3.5E-01	Max	5	2.3E+02	3.0E-01	0.002	1E-06	None Reported
Cumulative Corresponding Hazard Index[c]							**0.002**		
Cumulative Corresponding Cancer Risk[d]								**3E-04**	

[a] Corresponding Hazard Index equals 95% UCL divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{-6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,

Constituents selected as COPCs are indicated by shading.

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

UCL = Upper Confidence Limit

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations

in users guide (USEPA. September 2013. Prepared by Lockheed Martin Environmental Services).

UCL Rationale:

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.

(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

(5) Maximum detected concentration because sample set less than 5 samples.

(6) Maximum value used because ProUCL indicated not enough detected concentrations to compute meaningful or reliable statistics and estimates.

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 4

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Subsurface Soil Site 4	67-64-1	Acetone	2.3E-02	2.8E-02 J	MG/KG	CBD-S04-SB02-1618	2/5	0.016 - 0.037	2.8E-02	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-1	3.2E-04 J	3.2E-04 J	MG/KG	CBD-S04-SB02-1618	1/5	0.0021 - 0.005	3.2E-04	N/A	2.3E+03 ns	3.3E-01	SSL	NO	BSL
	534-52-1	4,6-Dinitro-2-methylphenol	2.2E-02 J	2.2E-02 J	MG/KG	CBD-S04-SB04-1012	1/5	0.19 - 0.2	2.2E-02	N/A	5.1E-01 n	2.6E-04	SSL	NO	BSL
	106-47-8	4-Chloroaniline	1.8E-02 J	1.8E-02 J	MG/KG	CBD-S04-SB04-1012	1/5	0.074 - 0.079	1.8E-02	N/A	2.7E+00 c	1.6E-04	SSL	NO	BSL
	100-52-7	Benzaldehyde	4.7E-02 L	4.7E-02 L	MG/KG	CBD-S04-SB04-1012	1/1	0.096 - 0.096	4.7E-02	N/A	7.8E+02 n	4.3E-02	SSL	NO	BSL
	218-01-9	Chrysene	1.5E-03 J	1.5E-03 J	MG/KG	CBD-S04-SB03-1416	1/5	0.019 - 0.02	1.5E-03	N/A	1.6E+01 c	1.2E+00	SSL	NO	BSL
	131-11-3	Dimethyl phthalate	2.4E-03 J	2.4E-03 J	MG/KG	CBD-S04-SB05-1315	1/5	0.019 - 0.02	2.4E-03	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	2.7E-03 J	2.7E-03 J	MG/KG	CBD-S04-SB03-1416	1/5	0.019 - 0.02	2.7E-03	N/A	2.4E+02 n	8.9E+00	SSL	NO	BSL
	621-64-7	n-Nitroso-di-n-propylamine	4.9E-02	4.9E-02	MG/KG	CBD-S04-SB04-1012	1/5	0.019 - 0.02	4.9E-02	N/A	7.8E-02 c	8.1E-06	SSL	NO	BSL
	85-01-8	Phenanthrene	1.2E-03 J	2.3E-03 J	MG/KG	CBD-S04-SB03-1416	2/5	0.019 - 0.02	2.3E-03	N/A	1.8E+03 n	N/A	N/A	NO	BSL
	108-95-2	Phenol	1.9E-03 J	1.9E-03 J	MG/KG	CBD-S04-SB04-1012	1/5	0.19 - 0.2	1.9E-03	N/A	1.9E+03 n	3.3E-01	SSL	NO	BSL
	129-00-0	Pyrene	1.9E-03 J	1.9E-03 J	MG/KG	CBD-S04-SB03-1416	1/5	0.019 - 0.02	1.9E-03	N/A	1.8E+02 n	1.3E+00	SSL	NO	BSL
	7429-90-5	Aluminum	1.6E+03	2.4E+03	MG/KG	CBD-S04-SB01-1820	5/5	10 - 10	2.4E+03	2.5E+04	7.7E+03 n	3.0E+03	SSL	NO	BSL
	7440-36-0	Antimony	9.7E-02 J	3.4E-01	MG/KG	CBD-S04-SB04-1012	3/5	0.1 - 0.1	3.4E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	1.6E+00	4.1E+00	MG/KG	CBD-S04-SB04-1012	5/5	0.092 - 0.1	4.1E+00	1.1E+01	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	4.1E+00	1.1E+01	MG/KG	CBD-S04-SB05-1315	5/5	1 - 1	1.1E+01	6.8E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.2E-01	1.1E+00	MG/KG	CBD-S04-SB02-1618	5/5	0.092 - 0.1	1.1E+00	1.0E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	2.7E-02 J	5.8E-02	MG/KG	CBD-S04-SB02-1618	5/5	0.046 - 0.05	5.8E-02	1.9E-01	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	3.8E+01 J	3.5E+02	MG/KG	CBD-S04-SB04-1012	5/5	50 - 50	3.5E+02	5.1E+02	NUT	NUT	N/A	NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**1.5E+00**	**1.5E+00**	**MG/KG**	**CBD-S04-SB01-1820**	**1/1**	**0.49 - 0.49**	**1.5E+00**	**N/A**	**3.0E-01 c**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	6.5E+00	1.2E+01	MG/KG	CBD-S04-SB03-1416	5/5	0.092 - 0.5	1.2E+01	3.9E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	5.8E-01	2.0E+00	MG/KG	CBD-S04-SB01-1820	5/5	0.092 - 0.1	2.0E+00	6.8E+00	2.3E+00 n	2.7E-02	SSL	NO	BSL
	7440-50-8	Copper	8.3E-01	1.9E+00	MG/KG	CBD-S04-SB04-1012	5/5	0.092 - 0.1	1.9E+00	1.0E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	57-12-5	Cyanide	6.2E-02 J	6.2E-02 J	MG/KG	CBD-S04-SB04-1012	1/5	0.11 - 0.12	6.2E-02	N/A	2.7E-01 n	1.5E-03	SSL	NO	BSL
	7439-89-6	Iron	3.5E+03	6.3E+03	MG/KG	CBD-S04-SB03-1416	5/5	5 - 5	6.3E+03	3.5E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	1.7E+00	2.6E+00	MG/KG	CBD-S04-SB01-1820	5/5	0.092 - 0.1	2.6E+00	1.4E+01	4.0E+02 n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	3.6E+02	5.4E+02	MG/KG	CBD-S04-SB01-1820	5/5	50 - 50	5.4E+02	2.3E+03	NUT	NUT	N/A	NO	NUT
	7439-96-5	Manganese	3.2E+00	2.4E+01	MG/KG	CBD-S04-SB01-1820	5/5	1 - 1	2.4E+01	5.5E+02	1.8E+02 n	2.8E+00	SSL	NO	BSL
	7439-97-6	Mercury	1.1E-02 J	1.1E-02 J	MG/KG	CBD-S04-SB04-1012	1/5	0.046 - 0.05	1.1E-02	6.0E-02	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	9.8E-01	2.5E+00	MG/KG	CBD-S04-SB01-1820	5/5	0.092 - 0.1	2.5E+00	1.1E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	3.1E+02	4.1E+02	MG/KG	CBD-S04-SB01-1820	5/5	50 - 50	4.1E+02	1.6E+03	NUT	NUT	N/A	NO	NUT
	7782-49-2	Selenium	1.8E-01	1.8E-01	MG/KG	CBD-S04-SB03-1416	1/5	0.092 - 0.1	1.8E-01	2.5E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	2.6E-02 J	3.8E-02 J	MG/KG	CBD-S04-SB03-1416	5/5	0.046 - 0.05	3.8E-02	5.1E-02	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-28-0	Thallium	7.0E-02	2.9E-01	MG/KG	CBD-S04-SB03-1416	5/5	0.046 - 0.05	2.9E-01	4.7E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	3.5E+00	7.5E+00	MG/KG	CBD-S04-SB03-1416	5/5	0.092 - 0.1	7.5E+00	3.8E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	7.2E+00	7.2E+00	MG/KG	CBD-S04-SB05-1315	1/5	1 - 5	7.2E+00	3.9E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 4

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 2 Subsurface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for Mercury Chloride (and other Mercury salts) used as surrogate for mercury.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
L = Biased Low
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level
ns = noncarcinogenic screening level may exceed Csat (soil saturation concentration)

TABLE 2.2a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 4 - Subsurface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)								
Chromium (hexavalent)	1 / 1	1.5E+00	CBD-S04-SB01-1820	2.3E+02	3.0E-01	0.007	5E-06	None Reported
Cumulative Corresponding Hazard Index[c]						**0.007**		
Cumulative Corresponding Cancer Risk[d]							**5E-06**	

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

RSL = Regional Screening Levels

TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 4
Site Investigation Report
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Groundwater Site 4	106-44-5	4-Methylphenol	1.6E-01 L	1.6E-01 L	UG/L	CBD-S04-GW03-1012	1/2	0.5 - 0.5	1.6E-01	N/A	1.9E+02	n	N/A	N/A	NO	BSL
	83-32-9	Acenaphthene	3.2E-02 J	3.2E-02 J	UG/L	CBD-S04-GW02-1012	1/2	0.5 - 0.5	3.2E-02	N/A	5.3E+01	n	N/A	N/A	NO	BSL
	98-86-2	Acetophenone	1.5E-01 L	2.0E-01 J	UG/L	CBD-S04-GW02-1012	2/2	0.5 - 0.5	2.0E-01	N/A	1.9E+02	n	N/A	N/A	NO	BSL
	100-52-7	Benzaldehyde	1.2E-01 J	1.2E-01 J	UG/L	CBD-S04-GW02-1012	1/2	0.5 - 0.5	1.2E-01	N/A	1.9E+02	n	N/A	N/A	NO	BSL
	132-64-9	Dibenzofuran	3.1E-02 L	3.1E-02 L	UG/L	CBD-S04-GW03-1012	1/2	0.5 - 0.5	3.1E-02	N/A	7.9E-01	n	N/A	N/A	NO	BSL
	84-66-2	Diethylphthalate	1.9E+00	1.9E+00	UG/L	CBD-S04-GW02-1012	1/2	0.5 - 0.5	1.9E+00	N/A	1.5E+03	n	N/A	N/A	NO	BSL
	131-11-3	Dimethyl phthalate	2.6E-01 J	2.6E-01 J	UG/L	CBD-S04-GW02-1012	1/2	0.5 - 0.5	2.6E-01	N/A	N/A		N/A	N/A	NO	NTX
	84-74-2	Di-n-butylphthalate	7.3E-01 J	7.3E-01 J	UG/L	CBD-S04-GW02-1012	1/2	1 - 1	7.3E-01	N/A	9.0E+01	n	N/A	N/A	NO	BSL
	206-44-0	Fluoranthene	5.2E-02 L	5.2E-02 L	UG/L	CBD-S04-GW03-1012	1/2	0.5 - 0.5	5.2E-02	N/A	8.0E+01	n	N/A	N/A	NO	BSL
	78-59-1	Isophorone	1.4E-01 J	1.4E-01 J	UG/L	CBD-S04-GW02-1012	1/2	0.5 - 0.5	1.4E-01	N/A	7.8E+01	c	N/A	N/A	NO	BSL
	108-95-2	Phenol	1.3E-01 J	1.6E-01 L	UG/L	CBD-S04-GW03-1012	2/2	0.5 - 0.5	1.6E-01	N/A	5.8E+02	n	N/A	N/A	NO	BSL
	129-00-0	Pyrene	3.1E-02 L	3.1E-02 L	UG/L	CBD-S04-GW03-1012	1/2	0.5 - 0.5	3.1E-02	N/A	1.2E+01	n	N/A	N/A	NO	BSL
	7429-90-5	**Aluminum**	**2.4E+01 J**	**9.9E+03**	**UG/L**	**CBD-S04-GW03-1012**	**2/2**	**100 - 100**	**9.9E+03**	**N/A**	**2.0E+03**	**n**	**50 - 200**	**SMCL**	**YES**	**ASL**
	7440-38-2	**Arsenic**	**1.7E+01**	**1.7E+01**	**UG/L**	**CBD-S04-GW03-1012**	**1/2**	**1 - 1**	**1.7E+01**	**N/A**	**5.2E-02**	**c**	**10**	**MCL**	**YES**	**ASL**
	7440-39-3	Barium	8.1E+01	1.3E+02	UG/L	CBD-S04-GW03-1012	2/2	10 - 10	1.3E+02	N/A	3.8E+02	n	2000	MCL	NO	BSL
	7440-41-7	Beryllium	4.6E-01 J	8.4E-01 J	UG/L	CBD-S04-GW03-1012	2/2	1 - 1	8.4E-01	N/A	2.5E+00	n	4	MCL	NO	BSL
	7440-43-9	**Cadmium**	**6.8E-01**	**3.5E+00**	**UG/L**	**CBD-S04-GW02-1012**	**2/2**	**0.2 - 0.2**	**3.5E+00**	**N/A**	**9.2E-01**	**n**	**5**	**MCL**	**YES**	**ASL**
	7440-70-2	Calcium	3.8E+03	9.5E+03	UG/L	CBD-S04-GW03-1012	2/2	500 - 500	9.5E+03	N/A	NUT		N/A	N/A	NO	NUT
	7440-47-3	Chromium	4.7E-01 J	9.2E+01	UG/L	CBD-S04-GW03-1012	2/2	1 - 5	9.2E+01	N/A	2.2E+03	n	100	MCL	NO	BSL
	7440-48-4	**Cobalt**	**1.1E+01**	**1.2E+01**	**UG/L**	**CBD-S04-GW03-1012**	**2/2**	**1 - 1**	**1.2E+01**	**N/A**	**6.0E-01**	**n**	**N/A**	**N/A**	**YES**	**ASL**
	7440-50-8	Copper	8.7E+00	8.7E+00	UG/L	CBD-S04-GW03-1012	1/2	1 - 1	8.7E+00	N/A	8.0E+01	n	N/A	N/A	NO	BSL
	7439-89-6	**Iron**	**2.2E+03**	**2.3E+04**	**UG/L**	**CBD-S04-GW03-1012**	**2/2**	**10 - 500**	**2.3E+04**	**N/A**	**1.4E+03**	**n**	**300**	**SMCL**	**YES**	**ASL**
	7439-92-1	**Lead**	**7.4E-01 J**	**1.8E+01**	**UG/L**	**CBD-S04-GW03-1012**	**2/2**	**1 - 1**	**1.8E+01**	**N/A**	**1.5E+01**	**n**	**15**	**MCL**	**YES**	**ASL**
	7439-95-4	Magnesium	3.0E+03	6.9E+03	UG/L	CBD-S04-GW03-1012	2/2	500 - 500	6.9E+03	N/A	NUT		N/A	N/A	NO	NUT
	7439-96-5	**Manganese**	**1.3E+02**	**2.2E+02**	**UG/L**	**CBD-S04-GW03-1012**	**2/2**	**10 - 10**	**2.2E+02**	**N/A**	**4.3E+01**	**n**	**50**	**SMCL**	**YES**	**ASL**
	7439-97-6	Mercury	2.0E-01	2.0E-01	UG/L	CBD-S04-GW02-1012	1/2	0.2 - 0.2	2.0E-01	N/A	5.7E-01	n	2	MCL	NO	BSL
	7440-02-0	Nickel	1.6E+01	2.7E+01	UG/L	CBD-S04-GW03-1012	2/2	1 - 1	2.7E+01	N/A	3.9E+01	n	N/A	N/A	NO	BSL
	7440-09-7	Potassium	2.5E+03	4.6E+03	UG/L	CBD-S04-GW03-1012	2/2	100 - 100	4.6E+03	N/A	NUT		N/A	N/A	NO	NUT
	7440-22-4	Silver	6.1E-02 J	6.1E-02 J	UG/L	CBD-S04-GW03-1012	1/2	0.2 - 0.2	6.1E-02	N/A	9.4E+00	n	N/A	N/A	NO	BSL
	7440-23-5	Sodium	8.7E+03	1.4E+04	UG/L	CBD-S04-GW02-1012	2/2	500 - 500	1.4E+04	N/A	NUT		N/A	N/A	NO	NUT
	7440-28-0	**Thallium**	**2.6E-01 J**	**1.5E+00**	**UG/L**	**CBD-S04-GW03-1012**	**2/2**	**1 - 1**	**1.5E+00**	**N/A**	**2.0E-02**	**n**	**2**	**MCL**	**YES**	**ASL**
	7440-62-2	**Vanadium**	**4.3E+01**	**4.3E+01**	**UG/L**	**CBD-S04-GW03-1012**	**1/2**	**1 - 1**	**4.3E+01**	**N/A**	**8.6E+00**	**n**	**N/A**	**N/A**	**YES**	**ASL**
	7440-66-6	Zinc	5.5E+01	9.9E+01	UG/L	CBD-S04-GW03-1012	2/2	20 - 20	9.9E+01	N/A	6.0E+02	n	5000	SMCL	NO	BSL

[1] Minimum/Maximum detected concentrations.
For metals, total results were used in the evaluation.
[2] Maximum concentration is used for screening.
[3] Background not available.
[4] Oak Ridge National Laboratory (ORNL). November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Tap Water RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). [Online].
Available: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Chromium(III) used as surrogate for chromium.
RSL value for Mercury (inorganic salts) used as surrogate for mercury.
The tap water value of 15 ug/L for lead is the action level provided in the Drinking Water Regulations and Health Advisories.
[5] Drinking water Maximum Contaminant Level (MCL) (USEPA, 2009).
[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

c = carcinogenic
COPC = Chemical of Potential Concern
J = Estimated Value
L = Biased Low
MCL = Maximum Contaminant Level
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Levels
SMCL = Maximum Contaminant Level, Secondary Drinking Water Standards

TABLE 2.3a
Step 2 Groundwater Screening - Risk Ratio, Maximum Detected Concentration
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland
Site 4 - Groundwater

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Tap Water RSL HQ=1	Carcinogenic Tap Water RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (µg/L)								
Aluminum	2 / 2	9.9E+03 J	CBD-S04-GW03-1012	2.0E+04	NA	0.5	NA	Neurological
Arsenic	1 / 1	1.7E+01	CBD-S04-GW03-1012	6.0E+00	5.2E-02	3	3E-04	Skin, Vascular
Cadmium	2 / 2	3.5E+00	CBD-S04-GW02-1012	9.2E+00	NA	0.4	NA	Kidney
Cobalt	2 / 2	1.2E+01	CBD-S04-GW03-1012	6.0E+00	NA	2	NA	Thyroid
Iron	2 / 2	2.3E+04	CBD-S04-GW03-1012	1.4E+04	NA	2	NA	Gastrointestinal System
Lead	2 / 2	1.8E+01 J	CBD-S04-GW03-1012	1.5E+01	NA	NA	NA	NA
Manganese	2 / 2	2.2E+02	CBD-S04-GW03-1012	4.3E+02	NA	0.5	NA	Nervous System
Thallium	2 / 2	1.5E+00 J	CBD-S04-GW03-1012	2.0E-01	NA	8	NA	Hair
Vanadium	1 / 1	4.3E+01	CBD-S04-GW03-1012	8.6E+01	NA	0.5	NA	Hair
Cumulative Corresponding Hazard Index[c]						**16**		
Cumulative Corresponding Cancer Risk[d]							**3E-04**	

Total Kidney HI =	0.4
Total Thyroid HI =	**2**
Total Gastrointestinal System HI =	**2**
Total Hair HI =	**8**
Total Skin System HI =	**3**
Total Vascular System HI =	**3**
Total Neurological/Nervous System HI =	**1**

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10 $^{-6}$ divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

µg/L = micrograms per liter

NA = Not available/not applicable

RSL = Regional Screening Levels

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 5

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Surface Soil Site 5	67-64-1	Acetone	9.8E-02	4.0E-01 J	MG/KG	CBD-S05-SS02-1012	6/6	0.013 - 0.92	4.0E-01	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	71-43-2	Benzene	3.2E-04 J	3.2E-04 J	MG/KG	CBD-S05-SS06-1012	1/6	0.00087 - 0.0013	3.2E-04	N/A	1.2E+00 c	2.3E-04	SSL	NO	BSL
	79-20-9	Methyl acetate	3.1E-02	3.1E-02	MG/KG	CBD-S05-SS05-1012	1/5	0.0044 - 0.0067	3.1E-02	N/A	7.8E+03 n	4.1E-01	SSL	NO	BSL
	108-88-3	Toluene	2.4E-04 J	1.8E-03 J	MG/KG	CBD-S05-SS05-1012	6/6	0.0017 - 0.0027	1.8E-03	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	2.6E-04 J	2.6E-04 J	MG/KG	CBD-S05-SS02-1012	1/6	0.0017 - 0.0027	2.6E-04	N/A	2.3E+03 ns	3.3E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	1.3E-02 J	3.3E-01 J	MG/KG	CBD-S05-SS03-1012	2/6	0.017 - 1	3.3E-01	N/A	2.4E+01 n	1.9E-02	SSL	NO	BSL
	83-32-9	Acenaphthene	1.7E-03 J	2.6E+00	MG/KG	CBD-S05-SS03-1012	3/6	0.017 - 1	2.6E+00	N/A	3.6E+02 n	5.5E-01	SSL	NO	BSL
	208-96-8	Acenaphthylene	1.3E-03 J	1.3E-03 J	MG/KG	CBD-S05-SS06-1012	1/6	0.017 - 1	1.3E-03	N/A	3.6E+02 n	N/A	N/A	NO	BSL
	120-12-7	Anthracene	1.2E-01	6.4E+00	MG/KG	CBD-S05-SS03-1012	2/6	0.017 - 1	6.4E+00	N/A	1.8E+03 n	5.8E+00	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**4.8E-03 J**	**3.0E+01**	**MG/KG**	**CBD-S05-SS03-1012**	**5/6**	**0.017 - 1**	**3.0E+01**	**N/A**	**1.6E-01 c**	**4.2E-03**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**5.2E-03 J**	**3.7E+00**	**MG/KG**	**CBD-S05-SS03-1012**	**5/6**	**0.01 - 0.49**	**3.7E+00**	**N/A**	**1.6E-02 c**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**6.6E-03 J**	**3.2E+01**	**MG/KG**	**CBD-S05-SS03-1012**	**5/6**	**0.017 - 1**	**3.2E+01**	**N/A**	**1.6E-01 c**	**4.1E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.9E-03 J	1.3E+01	MG/KG	CBD-S05-SS03-1012	5/6	0.018 - 2	1.3E+01	N/A	1.8E+02 n	N/A	N/A	NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**3.3E-03 J**	**1.1E+01**	**MG/KG**	**CBD-S05-SS03-1012**	**5/6**	**0.017 - 1**	**1.1E+01**	**N/A**	**1.6E+00 c**	**4.0E-01**	**SSL**	**YES**	**ASL**
	85-68-7	Butylbenzylphthalate	6.1E-02 J	6.1E-02 J	MG/KG	CBD-S05-SS01P-1012	1/6	0.034 - 2	6.1E-02	N/A	2.9E+02 c	2.4E-01	SSL	NO	BSL
	86-74-8	Carbazole	6.4E-02 J	3.1E+00 J	MG/KG	CBD-S05-SS03-1012	2/6	0.17 - 10	3.1E+00	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	**Chrysene**	**4.9E-03 J**	**2.6E+01**	**MG/KG**	**CBD-S05-SS03-1012**	**5/6**	**0.017 - 1**	**2.6E+01**	**N/A**	**1.6E+01 c**	**1.2E+00**	**SSL**	**YES**	**ASL**
	53-70-3	**Dibenz(a,h)anthracene**	**2.5E-02**	**4.2E-01 J**	**MG/KG**	**CBD-S05-SS03-1012**	**3/6**	**0.01 - 0.49**	**4.2E-01**	**N/A**	**1.6E-02 c**	**1.3E-02**	**SSL**	**YES**	**ASL**
	132-64-9	Dibenzofuran	3.9E-02	1.2E+00	MG/KG	CBD-S05-SS03-1012	2/6	0.017 - 1	1.2E+00	N/A	7.3E+00 n	1.5E-02	SSL	NO	BSL
	131-11-3	Dimethyl phthalate	2.6E-03 J	2.6E-03 J	MG/KG	CBD-S05-SS04-1012	1/6	0.017 - 1	2.6E-03	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	1.0E-03 J	4.5E+01	MG/KG	CBD-S05-SS03-1012	6/6	0.017 - 1	4.5E+01	N/A	2.4E+02 n	8.9E+00	SSL	NO	BSL
	86-73-7	Fluorene	6.0E-02	2.1E+00	MG/KG	CBD-S05-SS03-1012	2/6	0.018 - 2	2.1E+00	N/A	2.4E+02 n	5.4E-01	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.9E-03 J**	**1.3E+01**	**MG/KG**	**CBD-S05-SS03-1012**	**3/6**	**0.018 - 2**	**1.3E+01**	**N/A**	**1.6E-01 c**	**1.3E-01**	**SSL**	**YES**	**ASL**
	91-20-3	Naphthalene	2.7E-02	1.5E+00	MG/KG	CBD-S05-SS03-1012	2/6	0.017 - 1	1.5E+00	N/A	3.8E+00 c	5.4E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	3.5E-03 J	2.7E+01	MG/KG	CBD-S05-SS03-1012	5/6	0.017 - 1	2.7E+01	N/A	1.8E+03 n	N/A	N/A	NO	BSL
	129-00-0	Pyrene	7.3E-03 J	4.8E+01	MG/KG	CBD-S05-SS03-1012	5/6	0.017 - 1	4.8E+01	N/A	1.8E+02 n	1.3E+00	SSL	NO	BSL
	11097-69-1	Aroclor-1254	9.1E-03 J	4.6E-02	MG/KG	CBD-S05-SS03-1012	3/6	0.017 - 0.025	4.6E-02	N/A	1.2E-01 n	2.0E-03	SSL	NO	BSL
	11096-82-5	Aroclor-1260	5.6E-03 J	8.0E-02	MG/KG	CBD-S05-SS03-1012	4/6	0.017 - 0.025	8.0E-02	N/A	2.4E-01 c	5.5E-03	SSL	NO	BSL
	7429-90-5	Aluminum	2.3E+03	7.4E+03	MG/KG	CBD-S05-SS03-1012	6/6	10 - 250	7.4E+03	1.7E+04	7.7E+03 n	3.0E+03	SSL	NO	BSL
	7440-36-0	Antimony	6.6E-02 J	2.4E+00	MG/KG	CBD-S05-SS03-1012	6/6	0.1 - 0.1	2.4E+00	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	9.1E-01	5.1E+00	MG/KG	CBD-S05-SS03-1012	6/6	0.1 - 0.1	5.1E+00	1.0E+01	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	6.0E+00	3.9E+01	MG/KG	CBD-S05-SS03-1012	6/6	1 - 1	3.9E+01	6.7E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.5E-01	1.4E+00	MG/KG	CBD-S05-SS06-1012	6/6	0.1 - 0.1	1.4E+00	7.6E-01	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	3.3E-02 J	4.4E-01	MG/KG	CBD-S05-SS03-1012	6/6	0.05 - 0.05	4.4E-01	1.6E+00	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	2.5E+01 J	2.5E+03	MG/KG	CBD-S05-SS03-1012	6/6	50 - 50	2.5E+03	3.0E+03	NUT	NUT	N/A	NO	NUT
	18540-29-9	Chromium (hexavalent)	1.7E-01 J	1.7E-01 J	MG/KG	CBD-S05-SS01-1012	1/1	0.42 - 0.44	1.7E-01	N/A	3.0E-01 c	6.7E-04	SSL	NO	BSL
	7440-47-3	Chromium	4.8E+00	1.8E+01	MG/KG	CBD-S05-SS03-1012	6/6	0.1 - 1	1.8E+01	4.2E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	**Cobalt**	**7.0E-01**	**6.9E+00**	**MG/KG**	**CBD-S05-SS06-1012**	**6/6**	**0.1 - 0.1**	**6.9E+00**	**4.8E+00**	**2.3E+00 n**	**2.7E-02**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.9E+00	2.3E+02	MG/KG	CBD-S05-SS03-1012	6/6	0.1 - 2.5	2.3E+02	2.1E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	57-12-5	Cyanide	3.2E-02 J	6.5E-02 J	MG/KG	CBD-S05-SS03-1012	5/6	0.1 - 0.15	6.5E-02	N/A	2.7E-01 n	1.5E-03	SSL	NO	BSL
	7439-89-6	Iron	2.6E+03	1.4E+04	MG/KG	CBD-S05-SS03-1012	5/6	5 - 1200	1.4E+04	7.1E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 5

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
	7439-92-1	Lead	4.1E+00	1.4E+02	MG/KG	CBD-S05-SS03-1012	6/6	0.1 - 2.5	1.4E+02	6.2E+01	4.0E+02 n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	2.2E+02	1.3E+03	MG/KG	CBD-S05-SS03-1012	6/6	50 - 50	1.3E+03	1.2E+03	NUT	NUT	N/A	NO	NUT
	7439-96-5	Manganese	1.3E+01	1.0E+02	MG/KG	CBD-S05-SS06-1012	6/6	1 - 1	1.0E+02	3.3E+02	1.8E+02 n	2.8E+00	SSL	NO	BSL
	7439-97-6	Mercury	6.6E-03 J	1.1E-01	MG/KG	CBD-S05-SS03-1012	5/6	0.05 - 0.05	1.1E-01	1.1E-01	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	1.4E+00	1.5E+01	MG/KG	CBD-S05-SS06-1012	6/6	0.1 - 0.5	1.5E+01	1.0E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	2.2E+02	1.0E+03	MG/KG	CBD-S05-SS03-1012	6/6	50 - 50	1.0E+03	1.3E+03	NUT	NUT	N/A	NO	NUT
	7782-49-2	Selenium	1.0E-01	4.7E-01	MG/KG	CBD-S05-SS06-1012	6/6	0.1 - 0.1	4.7E-01	2.4E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	7.6E-02	6.8E-01	MG/KG	CBD-S05-SS06-1012	6/6	0.05 - 0.05	6.8E-01	1.4E-01	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-23-5	Sodium	2.2E+01 J	2.2E+01 J	MG/KG	CBD-S05-SS04-1012	1/6	50 - 50	2.2E+01	N/A	NUT	NUT	N/A	NO	NUT
	7440-28-0	Thallium	4.5E-02 J	1.3E-01	MG/KG	CBD-S05-SS03-1012	6/6	0.05 - 0.05	1.3E-01	3.3E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	6.3E+00	4.0E+01	MG/KG	CBD-S05-SS03-1012	6/6	0.1 - 1	4.0E+01	4.3E+01	3.9E+01 n	8.6E+00	**SSL**	NO	BBK
	7440-66-6	Zinc	5.9E+00	5.9E+00	MG/KG	CBD-S05-SS05-1012	1/6	1 - 50	5.9E+00	6.6E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 2 Surface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Acenaphthene used as surrogate for Acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for Mercuric Chloride (and other Mercury salts) used as surrogate for mercury.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Level (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level
ns = noncarcinogenic screening level may exceed Csat (soil saturation concentration)

TABLE 2.1a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 5 - Surface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Semivolatile Organic Compounds (mg/kg)								
Benzo(a)anthracene	5 / 6	3.0E+01	CBD-S05-SS03-1012	NA	1.6E-01	NA	2E-04	NA
Benzo(a)pyrene	5 / 6	3.7E+00	CBD-S05-SS03-1012	NA	1.6E-02	NA	2E-04	NA
Benzo(b)fluoranthene	5 / 6	3.2E+01	CBD-S05-SS03-1012	NA	1.6E-01	NA	2E-04	NA
Benzo(k)fluoranthene	5 / 6	1.1E+01	CBD-S05-SS03-1012	NA	1.6E+00	NA	7E-06	NA
Chrysene	5 / 6	2.6E+01	CBD-S05-SS03-1012	NA	1.6E+01	NA	2E-06	NA
Dibenz(a,h)anthracene	3 / 6	4.2E-01 J	CBD-S05-SS03-1012	NA	1.6E-02	NA	3E-05	NA
Indeno(1,2,3-cd)pyrene	3 / 6	1.3E+01	CBD-S05-SS03-1012	NA	1.6E-01	NA	8E-05	NA
Metals (mg/kg)								
Cobalt	6 / 6	6.9E+00	CBD-S05-SS06-1012	2.3E+01	4.2E+02	0.3	2E-08	Thyroid, Respiratory System
Cumulative Corresponding Hazard Index[c]						**0.3**		
Cumulative Corresponding Cancer Risk[d]							**7E-04**	

Total Thyroid System HI =	0.3
Total Respiratory System HI =	0.3

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

J = Estimated Value

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

Table 2.1b

Step 3 Soil Screening - Risk Ratio, 95% UCL

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 5 - Surface Soil

Analyte	Detection Frequency	95% UCL		95% UCL Rationale	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Semivolatile Organic Compounds (mg/kg)									
Benzo(a)anthracene	5 / 6	3.0E+01	Max	1, 2, 3	NA	1.6E-01	NA	2E-04	NA
Benzo(a)pyrene	5 / 6	3.7E+00	Max	1, 2, 3	NA	1.6E-02	NA	2E-04	NA
Benzo(b)fluoranthene	5 / 6	3.2E+01	Max	1, 2, 3	NA	1.6E-01	NA	2E-04	NA
Benzo(k)fluoranthene	5 / 6	1.1E+01	Max	1, 2, 3	NA	1.6E+00	NA	7E-06	NA
Chrysene	5 / 6	2.6E+01	Max	1, 2, 3	NA	1.6E+01	NA	2E-06	NA
Dibenz(a,h)anthracene	3 / 6	4.2E-01	Max	4	NA	1.6E-02	NA	3E-05	NA
Indeno(1,2,3-cd)pyrene	3 / 6	1.3E+01	Max	4	NA	1.6E-01	NA	8E-05	NA
Cumulative Corresponding Hazard Index[c]									
Cumulative Corresponding Cancer Risk[d]								**7E-04**	

Notes:

[a] Corresponding Hazard Index equals 95% UCL divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[u] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,

Constituents selected as COPCs are indicated by shading.

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

UCL = Upper Confidence Limit

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. September 2013. Prepared by Lockheed Martin Environmental Services).

UCL Rationale:

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.

(3) Maximum value used because calculated 95% UCL exceeds maximum concentration.

(4) The maximum detected concentration was used because ProUCL indicated not enough detected concentrations to compute meaningful or reliable statistics and estimates.

TABLE 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 5
Site Investigation Report
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [3] Toxicity Value	Potential ARAR/TBC Value	Potential [4] ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Subsurface Soil Site 5	78-93-3	2-Butanone	2.1E-01 J	2.1E-01 J	MG/KG	CBD-S05-SB03-1820	1/5	0.01 - 2.9	2.1E-01	N/A	2.7E+03 n	1.2E-01	SSL	NO	BSL
	67-64-1	Acetone	1.6E-02	4.3E-01 J	MG/KG	CBD-S05-SB03-1820	4/5	0.015 - 0.87	4.3E-01	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	71-43-2	Benzene	2.0E-04 J	2.0E-04 J	MG/KG	CBD-S05-SB04-2022	1/5	0.001 - 0.058	2.0E-04	N/A	1.2E+00 c	2.3E-04	SSL	NO	BSL
	100-41-4	Ethylbenzene	3.1E-01	3.1E-01	MG/KG	CBD-S05-SB03-1820	1/5	0.001 - 0.058	3.1E-01	N/A	5.8E+00 c	1.7E-03	SSL	NO	BSL
	98-82-8	Isopropylbenzene	2.6E+00	2.6E+00	MG/KG	CBD-S05-SB03-1820	1/5	0.001 - 0.058	2.6E+00	N/A	1.9E+02 n	7.4E-02	SSL	NO	BSL
	m&pXYLENE	m- and p-Xylene	3.9E-01	3.9E-01	MG/KG	CBD-S05-SB03-1820	1/5	0.002 - 0.12	3.9E-01	N/A	5.8E+01 n	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	2.0E-03 J	1.3E+00	MG/KG	CBD-S05-SB03-1820	2/5	0.005 - 0.29	1.3E+00	N/A	7.8E+03 n	4.1E-01	SSL	NO	BSL
	108-87-2	Methylcyclohexane	1.6E-01 J	1.6E-01 J	MG/KG	CBD-S05-SB03-1820	1/5	0.005 - 0.29	1.6E-01	N/A	6.1E+01 n	N/A	N/A	NO	BSL
	95-47-6	o-Xylene	6.5E-01	6.5E-01	MG/KG	CBD-S05-SB03-1820	1/5	0.001 - 0.058	6.5E-01	N/A	6.5E+01 n	1.9E-02	SSL	NO	BSL
	108-88-3	Toluene	7.5E-04 J	7.5E-04 J	MG/KG	CBD-S05-SB04-2022	1/5	0.002 - 0.058	7.5E-04	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	4.3E-04 J	4.3E-04 J	MG/KG	CBD-S05-SB05-2022	1/5	0.002 - 0.058	4.3E-04	N/A	2.3E+03 ns	3.3E-01	SSL	NO	BSL
	92-52-4	1,1-Biphenyl	4.5E-02	4.5E-02	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	4.5E-02	N/A	4.7E+00 n	8.7E-04	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	7.2E-01	7.2E-01	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	7.2E-01	N/A	2.4E+01 n	1.9E-02	SSL	NO	BSL
	83-32-9	Acenaphthene	9.3E-02	9.3E-02	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	9.3E-02	N/A	3.6E+02 n	5.5E-01	SSL	NO	BSL
	120-12-7	Anthracene	2.4E-03 J	2.4E-03 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	2.4E-03	N/A	1.8E+03 n	5.8E+00	SSL	NO	BSL
	56-55-3	Benzo(a)anthracene	5.6E-03 J	5.6E-03 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	5.6E-03	N/A	1.6E-01 c	4.2E-03	SSL	NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.0E-02 J	1.0E-02 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	1.0E-02	N/A	1.6E-01 c	N/A	SSL	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.3E-02 J	1.3E-02 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.04	1.3E-02	N/A	1.8E+02 n	1.3E+00	N/A	NO	BSL
	207-08-9	Benzo(k)fluoranthene	4.0E-03 J	4.0E-03 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	4.0E-03	N/A	1.6E+00 c	4.0E-01	SSL	NO	BSL
	218-01-9	Chrysene	5.2E-03 J	5.2E-03 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	5.2E-03	N/A	1.6E+01 c	1.2E+00	SSL	NO	BSL
	132-64-9	Dibenzofuran	5.9E-02	5.9E-02	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	5.9E-02	N/A	7.3E+00 n	1.5E-02	SSL	NO	BSL
	131-11-3	Dimethyl phthalate	2.3E-03 J	2.3E-03 J	MG/KG	CBD-S05-SB01-2022	1/5	0.019 - 0.02	2.3E-03	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	4.4E-03 J	4.4E-03 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	4.4E-03	N/A	2.4E+02 n	8.9E+00	SSL	NO	BSL
	86-73-7	Fluorene	2.5E-02	2.5E-02	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.04	2.5E-02	N/A	2.4E+02 n	5.4E-01	SSL	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	6.8E-03 J	6.8E-03 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.04	6.8E-03	N/A	1.6E-01 c	1.3E-01	SSL	NO	BSL
	91-20-3	Naphthalene	8.2E-02	8.2E-02	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	8.2E-02	N/A	3.8E+00 c	5.4E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	1.2E-03 J	1.3E-02 J	MG/KG	CBD-S05-SB03-1820	2/5	0.019 - 0.02	1.3E-02	N/A	1.8E+03 n	N/A	N/A	NO	BSL
	129-00-0	Pyrene	1.3E-02 J	1.3E-02 J	MG/KG	CBD-S05-SB03-1820	1/5	0.019 - 0.02	1.3E-02	N/A	1.8E+02 n	1.3E+00	SSL	NO	BSL
	7429-90-5	Aluminum	1.8E+03	7.0E+03	MG/KG	CBD-S05-SB04-2022	5/5	9.1 - 10	7.0E+03	2.5E+04	7.7E+03 n	3.0E+03	SSL	NO	BSL
	7440-36-0	Antimony	1.3E-01	3.3E-01	MG/KG	CBD-S05-SB03-1820	5/5	0.093 - 0.1	3.3E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	2.6E+00	4.4E+00	MG/KG	CBD-S05-SB04-2022	5/5	0.1 - 0.1	4.4E+00	1.1E+01	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	4.3E+00	9.4E+00	MG/KG	CBD-S05-SB04-2022	5/5	0.91 - 1	9.4E+00	6.8E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	2.1E+00	3.6E+00	MG/KG	CBD-S05-SB04-2022	5/5	0.1 - 0.1	3.6E+00	1.0E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	1.9E-01	4.6E-01	MG/KG	CBD-S05-SB04-2022	5/5	0.05 - 0.05	4.6E-01	1.9E-01	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	8.8E+01	4.5E+02	MG/KG	CBD-S05-SB05-2022	5/5	46 - 50	4.5E+02	5.1E+02	NUT	NUT	N/A	NO	NUT
	7440-47-3	Chromium	7.4E+00	9.0E+00	MG/KG	CBD-S05-SB02-2022	5/5	0.1 - 0.1	9.0E+00	3.9E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	**Cobalt**	**2.9E+00**	**1.1E+02**	**MG/KG**	**CBD-S05-SB04-2022**	**5/5**	**0.1 - 2.5**	**1.1E+02**	**6.8E+00**	**2.3E+00 n**	**2.7E-02**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.0E+00	5.6E+00	MG/KG	CBD-S05-SB03-1820	5/5	0.1 - 0.1	5.6E+00	1.0E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	7439-89-6	Iron	3.8E+03	5.1E+03	MG/KG	CBD-S05-SB04-2022	5/5	4.6 - 5	5.1E+03	3.5E+04	5.5E+03 n	3.5E+01	SSL	NO	BSL
	7439-92-1	Lead	1.6E+00	3.4E+00	MG/KG	CBD-S05-SB03-1820	5/5	0.1 - 0.1	3.4E+00	1.4E+01	4.0E+02 n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	5.6E+02	8.6E+02	MG/KG	CBD-S05-SB02-2022	5/5	46 - 50	8.6E+02	2.3E+03	NUT	NUT	N/A	NO	NUT
	7439-96-5	Manganese	1.2E+01	2.9E+02	MG/KG	CBD-S05-SB04-2022	5/5	0.91 - 1	2.9E+02	5.5E+02	1.8E+02 n	2.8E+00	SSL	NO	BBK

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 5

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [3] Toxicity Value	Potential ARAR/TBC Value	Potential [4] ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	7440-02-0	Nickel	4.8E+00	3.2E+01	MG/KG	CBD-S05-SB04-2022	5/5	0.1 - 1	3.2E+01	1.1E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	3.8E+02	5.3E+02	MG/KG	CBD-S05-SB02-2022	5/5	46 - 50	5.3E+02	1.6E+03	NUT	NUT	N/A	NO	NUT
	7782-49-2	Selenium	7.1E-02 J	8.6E-01	MG/KG	CBD-S05-SB04-2022	5/5	0.1 - 0.1	8.6E-01	2.5E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	2.3E-02 J	2.9E-01	MG/KG	CBD-S05-SB03-1820	5/5	0.05 - 0.05	2.9E-01	5.1E-02	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-23-5	Sodium	3.1E+01 J	3.1E+01 J	MG/KG	CBD-S05-SB01-2022	1/5	46 - 50	3.1E+01	N/A	NUT	NUT	N/A	NO	NUT
	7440-28-0	Thallium	1.4E-01	3.1E-01	MG/KG	CBD-S05-SB04-2022	5/5	0.05 - 0.05	3.1E-01	4.7E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	4.6E+00	1.1E+01	MG/KG	CBD-S05-SB04-2022	5/5	0.1 - 0.5	1.1E+01	3.8E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	7.8E+01	7.8E+01	MG/KG	CBD-S05-SB01P-2022	1/5	10 - 25	7.8E+01	3.9E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 2 Subsurface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium(III) used as surrogate for chromium.
RSL value for n-Hexane used as a surrogate for methylcyclohexane.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason:	Above Screening Levels (ASL)
Deletion Reason:	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)
	Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level
ns = noncarcinogenic screening level may exceed Csat (soil saturation concentration)

TABLE 2.2a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 5 - Subsurface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)								
Cobalt	5 / 5	1.1E+02	CBD-S05-SB04-2022	2.3E+01	4.2E+02	5	3E-07	Thyroid, Respiratory System
Cumulative Corresponding Hazard Index[c]						**5**		
Cumulative Corresponding Cancer Risk[d]							**3E-07**	

Total Thyroid HI =	5
Total Respiratory System HI =	5

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{-6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

Table 2.2b

Step 3 Soil Screening - Risk Ratio, 95% UCL

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 5 - Subsurface Soil

Analyte	Detection Frequency	95% UCL		95% UCL Rationale	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)									
Cobalt	5 / 5	1.1E+02	Max	1	2.3E+01	4.2E+02	5	3E-07	Thyroid, Respiratory System
Cumulative Corresponding Hazard Index[c]							**5**		
Cumulative Corresponding Cancer Risk[d]								**3E-07**	

Total Thyroid HI =	5
Total Respiratory System HI =	5

Notes:

[a] Corresponding Hazard Index equals 95% UCL divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,

Constituents selected as COPCs are indicated by shading.

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

UCL = Upper Confidence Limit

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. September 2013. Prepared by Lockheed Martin Environmental Services).

UCL Rationale:

(1) Maximum value used because calculated 95% UCL exceeds maximum concentration.

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 7
Site Investigation Report
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Surface Soil Site 7	78-93-3	2-Butanone	1.0E-03 J	8.7E-03 J	MG/KG	CBD-S07-SS08-1012	9/9	0.0086 - 0.014	8.7E-03	N/A	2.7E+03 n	1.2E-01	SSL	NO	BSL
	591-78-6	2-Hexanone	5.5E-04 J	5.5E-04 J	MG/KG	CBD-S07-SS05-1012	1/9	0.0086 - 0.014	5.5E-04	N/A	2.0E+01 n	8.8E-04	SSL	NO	BSL
	67-64-1	Acetone	1.2E-02 J	2.5E-01 J	MG/KG	CBD-S07-SS05-1012	9/9	0.013 - 0.021	2.5E-01	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	m&pXYLENE	m- and p-Xylene	4.0E-04 J	4.0E-04 J	MG/KG	CBD-S07-SS03-1012	1/9	0.0017 - 0.0028	4.0E-04	N/A	5.8E+01 n	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	8.1E-03	8.1E-03	MG/KG	CBD-S07-SS05-1012	1/9	0.0043 - 0.007	8.1E-03	N/A	7.8E+03 n	4.1E-01	SSL	NO	BSL
	95-47-6	o-Xylene	1.5E-04 J	1.5E-04 J	MG/KG	CBD-S07-SS03-1012	1/9	0.00086 - 0.0014	1.5E-04	N/A	6.5E+01 n	1.9E-02	SSL	NO	BSL
	108-88-3	Toluene	2.9E-03	2.9E-03	MG/KG	CBD-S07-SS01-1012	1/9	0.0017 - 0.0028	2.9E-03	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	11097-69-1	Aroclor-1254	5.0E-02	5.0E-02	MG/KG	CBD-S07-SS07-1012 : CBD-S07-SS08-1012	2/9	0.018 - 0.097	5.0E-02	N/A	1.2E-01 n	2.0E-03	SSL	NO	BSL
	11096-82-5	**Aroclor-1260**	**4.2E-03 J**	**9.4E-01**	**MG/KG**	**CBD-S07-SS01P-1012**	**7/9**	**0.018 - 0.097**	**9.4E-01**	**N/A**	**2.4E-01 c**	**5.5E-03**	**SSL**	**YES**	**ASL**
	7429-90-5	Aluminum	2.6E+03	6.6E+03	MG/KG	CBD-S07-SS01-1012 : CBD-S07-SS03-1012	9/9	10 - 250	6.6E+03	9.3E+03	7.7E+03 n	3.0E+03	SSL	NO	BSL
	7440-36-0	Antimony	7.7E-02 J	4.0E-01	MG/KG	CBD-S07-SS07-1012	9/9	0.093 - 0.1	4.0E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	1.3E+00	3.5E+00	MG/KG	CBD-S07-SS07-1012	9/9	0.094 - 0.1	3.5E+00	6.2E+00	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	6.4E+00	3.3E+01	MG/KG	CBD-S07-SS07-1012	9/9	1 - 1	3.3E+01	1.1E+02	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.5E-01	4.5E-01	MG/KG	CBD-S07-SS07-1012	9/9	0.094 - 0.1	4.5E-01	1.0E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	2.4E-02 J	5.2E-01	MG/KG	CBD-S07-SS07-1012	9/9	0.047 - 0.05	5.2E-01	1.1E+00	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	1.5E+02	1.6E+04	MG/KG	CBD-S07-SS07-1012	9/9	50 - 50	1.6E+04	3.6E+03	NUT	NUT	N/A	NO	NUT
	18540-29-9	Chromium (hexavalent)	3.0E-01 J	3.0E-01 J	MG/KG	CBD-S07-SS01P-1012	1/1	0.44 - 0.45	3.0E-01	N/A	3.0E-01 c	6.7E-04	SSL	NO	BSL
	7440-47-3	Chromium	5.0E+00	2.1E+01	MG/KG	CBD-S07-SS01-1012 : CBD-S07-SS01P-1012 : CBD-S07-SS07-1012	9/9	0.094 - 0.5	2.1E+01	2.7E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	9.4E-01	2.6E+00	MG/KG	CBD-S07-SS03-1012 : CBD-S07-SS07-1012	9/9	0.094 - 0.1	2.6E+00	5.4E+00	2.3E+00 n	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	2.2E+00	9.9E+00	MG/KG	CBD-S07-SS07-1012	9/9	0.094 - 0.5	9.9E+00	4.4E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	57-12-5	**Cyanide**	**2.7E-02 J**	**3.2E-01**	**MG/KG**	**CBD-S07-SS07-1012**	**5/9**	**0.11 - 0.12**	**3.2E-01**	**N/A**	**2.7E-01 n**	**1.5E-03**	**SSL**	**YES**	**ASL**
	7439-89-6	Iron	3.9E+03	1.5E+04	MG/KG	CBD-S07-SS07-1012	9/9	5 - 120	1.5E+04	1.7E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	3.4E+00	6.4E+01	MG/KG	CBD-S07-SS08-1012	9/9	0.094 - 1	6.4E+01	9.6E+01	4.0E+02 n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	2.1E+02	4.3E+03	MG/KG	CBD-S07-SS07-1012	9/9	50 - 50	4.3E+03	1.8E+03	NUT	NUT	N/A	NO	NUT
	7439-96-5	Manganese	1.6E+01	1.3E+02	MG/KG	CBD-S07-SS07-1012	9/9	1 - 1	1.3E+02	2.1E+02	1.8E+02 n	2.8E+00	SSL	NO	BSL
	7439-97-6	Mercury	6.2E-03 J	4.7E-02 J	MG/KG	CBD-S07-SS07-1012	8/9	0.047 - 0.05	4.7E-02	9.9E-01	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	1.2E+00	1.9E+01	MG/KG	CBD-S07-SS07-1012	9/9	0.094 - 0.5	1.9E+01	1.5E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	2.4E+02	1.0E+03	MG/KG	CBD-S07-SS07-1012	9/9	50 - 50	1.0E+03	9.9E+02	NUT	NUT	N/A	NO	NUT
	7782-49-2	Selenium	3.4E-01	3.4E-01	MG/KG	CBD-S07-SS07-1012	1/9	0.094 - 0.1	3.4E-01	2.8E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	1.9E-02 J	6.5E-02	MG/KG	CBD-S07-SS07-1012	9/9	0.047 - 0.05	6.5E-02	8.7E+00	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-23-5	Sodium	1.1E+02	1.1E+02	MG/KG	CBD-S07-SS09-1012	1/9	50 - 50	1.1E+02	N/A	NUT	NUT	N/A	NO	NUT

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 7

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
	7440-28-0	Thallium	4.2E-02 J	2.0E-01	MG/KG	CBD-S07-SS01-1012	9/9	0.047 - 0.05	2.0E-01	4.4E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	**Vanadium**	**7.1E+00**	**7.8E+01**	**MG/KG**	**CBD-S07-SS07-1012 : CBD-S07-SS08-1012**	**9/9**	**0.094 - 1**	**7.8E+01**	**2.6E+01**	**3.9E+01 n**	**8.6E+00**	**SSL**	**YES**	**ASL**
	7440-66-6	Zinc	5.3E+00	2.6E+02	MG/KG	CBD-S07-SS07-1012	9/9	0.94 - 50	2.6E+02	1.4E+02	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 3 Surface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Chromium (III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for total xylenes used as surrogate for m- and p-xylene.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level

TABLE 2.1a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 7 - Surface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
PCBs (mg/kg)								
Aroclor-1260	7 / 9	9.4E-01	CBD-S07-SS01P-1012	NA	2.4E-01	NA	4E-06	NA
Metals (mg/kg)								
Cyanide	5 / 9	3.2E-01	CBD-S07-SS07-1012	2.7E+00	N/A	0.1		Reproductive
Vanadium	9 / 9	7.8E+01	CBD-S07-SS07-1012 : CBD-S07-SS08-1012	3.9E+02		0.2	NA	Hair
Cumulative Corresponding Hazard Index[c]						**0.3**		
Cumulative Corresponding Cancer Risk[d]							**4E-06**	
							Total Hair HI =	0.2
							Total Reproductive HI =	0.1

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

TABLE 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 7
Site Investigation Report
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Subsurface Soil Site 7	78-93-3	2-Butanone	1.1E-03 J	4.1E-03 J	MG/KG	CBD-S07-SB09-0608	4/19	0.008 - 0.015	4.1E-03	N/A	2.7E+03	n	1.2E-01	SSL	NO	BSL
	591-78-6	2-Hexanone	6.9E-04 J	6.9E-04 J	MG/KG	CBD-S07-SB15-0204	1/19	0.008 - 0.015	6.9E-04	N/A	2.0E+01	n	8.8E-04	SSL	NO	BSL
	67-64-1	Acetone	2.4E-02 J	8.8E-02 J	MG/KG	CBD-S07-SB09-0608	4/19	0.012 - 0.022	8.8E-02	N/A	6.1E+03	n	2.9E-01	SSL	NO	BSL
	71-43-2	Benzene	2.0E-04 J	1.7E-01 J	MG/KG	CBD-S07-SB01-0608	4/19	0.0008 - 0.0015	1.7E-01	N/A	1.2E+00	c	2.3E-04	SSL	NO	BSL
	74-83-9	Bromomethane	3.9E-04 J	1.2E-03 J	MG/KG	CBD-S07-SB15-0204	3/19	0.0032 - 0.006	1.2E-03	N/A	6.8E-01	n	1.9E-04	SSL	NO	BSL
	75-15-0	Carbon disulfide	2.5E-04 J	2.5E-04 J	MG/KG	CBD-S07-SB19-0204	1/19	0.0008 - 0.0015	2.5E-04	N/A	7.7E+01	n	2.4E-02	SSL	NO	BSL
	110-82-7	Cyclohexane	1.3E-04 J	5.7E-01 J	MG/KG	CBD-S07-SB01-0608	3/19	0.004 - 0.28	5.7E-01	N/A	6.5E+02	n	1.3E+00	SSL	NO	BSL
	100-41-4	Ethylbenzene	1.8E-02 J	5.2E-01	MG/KG	CBD-S07-SB03-0608	3/19	0.0008 - 0.07	5.2E-01	N/A	5.8E+00	c	1.7E-03	SSL	NO	BSL
	98-82-8	Isopropylbenzene	1.6E-01 J	4.1E-01	MG/KG	CBD-S07-SB03-0608	3/19	0.0008 - 0.057	4.1E-01	N/A	1.9E+02	n	7.4E-02	SSL	NO	BSL
	m&pXYLENE	m- and p-Xylene	7.3E-02 J	2.5E+00	MG/KG	CBD-S07-SB03-0608	3/19	0.0016 - 0.14	2.5E+00	N/A	5.8E+00	n	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	9.5E-03	2.0E-02 J	MG/KG	CBD-S07-SB01-0608	2/19	0.004 - 0.0075	2.0E-02	N/A	7.8E+03	n	4.1E-01	SSL	NO	BSL
	108-87-2	Methylcyclohexane	1.5E-04 J	1.2E+00	MG/KG	CBD-S07-SB02-0507	6/19	0.004 - 0.28	1.2E+00	N/A	6.1E+01	n	N/A	N/A	NO	BSL
	95-47-6	o-Xylene	4.1E-02 J	6.6E-01	MG/KG	CBD-S07-SB03-0608	3/19	0.0008 - 0.07	6.6E-01	N/A	6.5E+01	n	1.9E-02	SSL	NO	BSL
	108-88-3	Toluene	4.3E-03	4.0E-02	MG/KG	CBD-S07-SB03-0608	2/19	0.0016 - 0.003	4.0E-02	N/A	4.9E+02	n	7.6E-02	SSL	NO	BSL
	11096-82-5	Aroclor-1260	4.6E-03 J	8.5E-02	MG/KG	CBD-S07-SB01-0608	3/19	0.017 - 0.03	8.5E-02	N/A	2.4E-01	c	5.5E-03	SSL	NO	BSL
	7429-90-5	**Aluminum**	**1.6E+03**	**1.0E+04**	**MG/KG**	**CBD-S07-SB07-0608 : CBD-S07-SB08-0608**	**19/19**	**9.2 - 250**	**1.0E+04**	**9.7E+03**	**7.7E+03**	**n**	**3.0E+03**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	6.0E-02 J	2.1E-01	MG/KG	CBD-S07-SB08-0608	19/19	0.091 - 0.1	2.1E-01	N/A	3.1E+00	n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	1.0E+00	5.5E+00	MG/KG	CBD-S07-SB09-0608	18/19	0.092 - 0.1	5.5E+00	7.0E+00	6.8E-01	c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	6.5E+00	3.8E+01	MG/KG	CBD-S07-SB12-0204	19/19	0.92 - 1	3.8E+01	4.5E+01	1.5E+03	n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.3E-01	1.1E+00	MG/KG	CBD-S07-SB16-0204	19/19	0.092 - 0.1	1.1E+00	1.1E+00	1.6E+01	n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	7.2E-03 J	7.1E-01	MG/KG	CBD-S07-SB01P-0608	19/19	0.046 - 0.05	7.1E-01	9.5E-01	7.1E+00	n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	1.2E+02	4.3E+03	MG/KG	CBD-S07-SB11-0204	19/19	46 - 50	4.3E+03	2.5E+03	NUT		NUT	N/A	NO	NUT
	18540-29-9	**Chromium (hexavalen**	**3.1E-01 J**	**3.1E-01 J**	**MG/KG**	**CBD-S07-SB01P-0608**	**1/1**	**0.45 - 0.54**	**3.1E-01**	**N/A**	**3.0E-01**	**c**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	2.4E+00	4.1E+01	MG/KG	CBD-S07-SB09-0608	19/19	0.094 - 0.5	4.1E+01	3.9E+01	1.2E+04	n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	3.5E-01	5.2E+00	MG/KG	CBD-S07-SB01P-0608	19/19	0.092 - 0.1	5.2E+00	7.9E+00	2.3E+00	n	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	1.2E+00	5.2E+00	MG/KG	CBD-S07-SB01-0608	19/19	0.092 - 0.1	5.2E+00	5.9E+00	3.1E+02	n	2.8E+00	SSL	NO	BSL
	57-12-5	Cyanide	4.0E-02 J	6.5E-02 J	MG/KG	CBD-S07-SB09-0608	3/19	0.097 - 0.18	6.5E-02	N/A	2.7E-01	n	1.5E-03	SSL	NO	BSL
	7439-89-6	**Iron**	**3.3E+03**	**2.1E+04**	**MG/KG**	**CBD-S07-SB09-0608**	**19/19**	**4.6 - 1200**	**2.1E+04**	**1.9E+04**	**5.5E+03**	**n**	**3.5E+01**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	2.0E+00	8.8E+00 L	MG/KG	CBD-S07-SB01-0608	19/19	0.092 - 0.5	8.8E+00	1.3E+01	4.0E+02	n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	1.6E+02	2.5E+03	MG/KG	CBD-S07-SB07-0608 : CBD-S07-SB08-0608	19/19	46 - 50	2.5E+03	2.8E+03	NUT		NUT	N/A	NO	NUT
	7439-96-5	**Manganese**	**7.5E+00**	**2.5E+02**	**MG/KG**	**CBD-S07-SB09-0608**	**19/19**	**0.92 - 1**	**2.5E+02**	**8.0E+01**	**1.8E+02**	**n**	**2.8E+00**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	6.7E-03 J	2.8E-02 J	MG/KG	CBD-S07-SB08-0608	9/19	0.046 - 0.05	2.8E-02	3.8E-02	2.3E+00	n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	6.6E-01	2.0E+01 K	MG/KG	CBD-S07-SB01-0608	19/19	0.092 - 0.5	2.0E+01	1.6E+01	1.5E+02	n	2.6E+00	SSL	NO	BSL

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 7

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
	7440-09-7	Potassium	2.0E+02	1.5E+03	MG/KG	CBD-S07-SB07-0608	19/19	46 - 50	1.5E+03	1.6E+03	NUT	NUT	N/A	NO	NUT
	7782-49-2	Selenium	1.3E-01	4.5E-01	MG/KG	CBD-S07-SB15-0204	9/19	0.092 - 0.1	4.5E-01	2.8E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	1.5E-02 J	6.0E-02	MG/KG	CBD-S07-SB09-0608	16/19	0.046 - 0.05	6.0E-02	2.1E-01	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-23-5	Sodium	7.5E+01	9.2E+02	MG/KG	CBD-S07-SB07-0608	15/19	46 - 50	9.2E+02	N/A	NUT	NUT	N/A	NO	NUT
	7440-28-0	**Thallium**	**2.7E-02 J**	**4.7E-01**	**MG/KG**	**CBD-S07-SB01P-0608**	**19/19**	**0.046 - 0.05**	**4.7E-01**	**3.2E-01**	**7.8E-02 n**	**1.4E-03**	**SSL**	**YES**	**ASL**
	7440-62-2	Vanadium	1.3E+00	2.1E+01	MG/KG	CBD-S07-SB14-0204	19/19	0.094 - 0.5	2.1E+01	2.1E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	3.7E+00	1.9E+02	MG/KG	CBD-S07-SB01P-0608	8/19	0.94 - 25	1.9E+02	4.3E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 3 Subsurface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Chromium (III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for total xylenes used as surrogate for m- and p-xylene.
RSL value for n-hexane used as surrogate for methylcyclohexane.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
K = Biased High
L = Biased Low
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level

TABLE 2.2a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 7 - Subsurface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)								
Aluminum	19 / 19	1.0E+04	CBD-S07-SB07-0608 : CBD-S07-SB08-0608	7.7E+04	N/A	0.1	N/A	Nervous System
Chromium (hexavalent)	1 / 1	3.1E-01 J	CBD-S07-SB01P-0608	2.3E+02	3.0E-01	0.001	1E-06	None Reported
Iron	19 / 19	2.1E+04	CBD-S07-SB09-0608	5.5E+04	NA	0.4	NA	Gastrointestinal System
Manganese	19 / 19	2.5E+02	CBD-S07-SB09-0608	1.8E+03	NA	0.1	NA	Nervous System
Thallium	19 / 19	4.7E-01	CBD-S07-SB01P-0608	7.8E-01	NA	0.6	NA	Hair
Cumulative Corresponding Hazard Index[c]						**1**		
Cumulative Corresponding Cancer Risk[d]							**1E-06**	

Total Gastrointestinal System HI =	0.4
Total Nervous System HI =	0.3
Total Hair HI =	0.6

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

TABLE 2.2b

Step 2 Soil Screening - Risk Ratio, 95% UCL

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 7 - Subsurface Soil

Analyte	Detection Frequency	95%UCL		95% UCL Rationale	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)									
Thallium	19 / 19	2.1E-01	95% Student's-t	1, 2, 3	7.8E-01	NA	0.3	NA	Hair
Cumulative Corresponding Hazard Index[c]							**0.3**		
Cumulative Corresponding Cancer Risk[d]								**0E+00**	
								Total hair HI =	0.3

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{-6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. September 2013. Prepared by Lockheed Martin Environmental Services).

UCL Rationale:

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.

Table 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 9
Site Investigation Report
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Surface Soil Site 9	78-93-3	2-Butanone	4.0E-03 J	8.1E-03 J	MG/KG	CBD-S09-SS01-1012 : CBD-S09-SS04-1012	4/4	0.0093 - 0.013	8.1E-03	N/A	2.7E+03 n	1.2E-01	SSL	NO	BSL
	591-78-6	2-Hexanone	7.4E-03 L	7.4E-03 L	MG/KG	CBD-S09-SS01-1012	1/4	0.0093 - 0.013	7.4E-03	N/A	2.0E+01 n	8.8E-04	SSL	NO	BSL
	67-64-1	Acetone	3.5E-02	6.7E-02	MG/KG	CBD-S09-SS04-1012	4/4	0.014 - 0.02	6.7E-02	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	71-43-2	Benzene	2.1E-04 J	4.3E-03	MG/KG	CBD-S09-SS04-1012	2/4	0.00093 - 0.0013	4.3E-03	N/A	1.2E+00 c	2.3E-04	SSL	NO	BSL
	75-15-0	Carbon disulfide	1.1E-03 J	8.4E-03 J	MG/KG	CBD-S09-SS03-1012	2/4	0.00093 - 0.0013	8.4E-03	N/A	7.7E+01 n	2.4E-02	SSL	NO	BSL
	110-82-7	Cyclohexane	3.4E-03 J	3.4E-03 J	MG/KG	CBD-S09-SS04-1012	1/4	0.0047 - 0.0066	3.4E-03	N/A	6.5E+02 n	1.3E+00	SSL	NO	BSL
	100-41-4	Ethylbenzene	1.7E-03	1.7E-03	MG/KG	CBD-S09-SS04-1012	1/4	0.00093 - 0.0013	1.7E-03	N/A	5.8E+00 c	1.7E-03	SSL	NO	BSL
	98-82-8	Isopropylbenzene	1.1E-03 J	1.1E-03 J	MG/KG	CBD-S09-SS04-1012	1/4	0.00093 - 0.0013	1.1E-03	N/A	1.9E+02 n	7.4E-02	SSL	NO	BSL
	m&pXYLENE	m- and p-Xylene	4.3E-03	4.3E-03	MG/KG	CBD-S09-SS04-1012	1/4	0.0019 - 0.0026	4.3E-03	N/A	5.8E+01 n	N/A	N/A	NO	BSL
	108-87-2	Methylcyclohexane	6.5E-03 J	6.5E-03 J	MG/KG	CBD-S09-SS04-1012	1/4	0.0047 - 0.0066	6.5E-03	N/A	6.1E+01 n	N/A	N/A	NO	BSL
	95-47-6	o-Xylene	2.9E-03	2.9E-03	MG/KG	CBD-S09-SS04-1012	1/4	0.00093 - 0.0013	2.9E-03	N/A	6.5E+01 n	1.9E-02	SSL	NO	BSL
	100-42-5	Styrene	1.8E-03	1.8E-03	MG/KG	CBD-S09-SS04-1012	1/4	0.00093 - 0.0013	1.8E-03	N/A	6.0E+02 n	1.3E-01	SSL	NO	BSL
	108-88-3	Toluene	8.6E-03	8.6E-03	MG/KG	CBD-S09-SS04-1012	1/4	0.0019 - 0.0026	8.6E-03	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	120-12-7	Anthracene	2.2E-03 J	1.2E-02 J	MG/KG	CBD-S09-SS04-1012	2/4	0.035 - 0.078	1.2E-02	N/A	1.8E+03 n	5.8E+00	SSL	NO	BSL
	56-55-3	Benzo(a)anthracene	1.0E-02 J	1.5E-01 J	MG/KG	CBD-S09-SS04-1012	3/4	0.035 - 0.078	1.5E-01	N/A	1.6E-01 c	4.2E-03	SSL	NO	BSL
	50-32-8	**Benzo(a)pyrene**	**1.8E-02 J**	**4.6E-02 J**	**MG/KG**	**CBD-S09-SS04-1012**	**2/4**	**0.021 - 0.093**	**4.6E-02**	**N/A**	**1.6E-02 c**	**4.0E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**1.6E-02 J**	**3.7E-01 J**	**MG/KG**	**CBD-S09-SS04-1012**	**3/4**	**0.035 - 0.078**	**3.7E-01**	**N/A**	**1.6E-01 c**	**4.1E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	9.1E-02 J	9.1E-02 J	MG/KG	CBD-S09-SS04-1012	1/4	0.071 - 0.15	9.1E-02	N/A	1.8E+02 n	N/A	N/A	NO	BSL
	207-08-9	Benzo(k)fluoranthene	9.1E-02 J	9.1E-02 J	MG/KG	CBD-S09-SS04-1012	1/4	0.035 - 0.078	9.1E-02	N/A	1.6E+00 c	4.0E-01	SSL	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.2E-02 J	9.1E-02 J	MG/KG	CBD-S09-SS04-1012	3/4	0.071 - 0.15	9.1E-02	N/A	3.9E+01 c	1.3E+00	SSL	NO	BSL
	218-01-9	Chrysene	1.7E-01 J	1.7E-01 J	MG/KG	CBD-S09-SS04-1012	1/4	0.035 - 0.078	1.7E-01	N/A	1.6E+01 c	1.2E+00	SSL	NO	BSL
	206-44-0	Fluoranthene	3.6E-03 J	2.1E-01	MG/KG	CBD-S09-SS04-1012	4/4	0.035 - 0.078	2.1E-01	N/A	2.4E+02 n	8.9E+00	SSL	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	8.8E-02 J	8.8E-02 J	MG/KG	CBD-S09-SS04-1012	1/4	0.071 - 0.15	8.8E-02	N/A	1.6E-01 c	1.3E-01	SSL	NO	BSL
	85-01-8	Phenanthrene	2.1E-03 J	1.3E-01	MG/KG	CBD-S09-SS04-1012	4/4	0.035 - 0.078	1.3E-01	N/A	1.8E+03 n	N/A	N/A	NO	BSL
	129-00-0	Pyrene	5.7E-03 J	3.2E-01 J	MG/KG	CBD-S09-SS04-1012	4/4	0.035 - 0.078	3.2E-01	N/A	1.8E+02 n	1.3E+00	SSL	NO	BSL
	7429-90-5	Aluminum	2.6E+03	4.7E+03	MG/KG	CBD-S09-SS03-1012	4/4	10 - 10	4.7E+03	9.3E+03	7.7E+03 n	3.0E+03	SSL	NO	BSL
	7440-36-0	Antimony	3.8E-01	8.8E-01	MG/KG	CBD-S09-SS03-1012	2/4	0.1 - 0.1	8.8E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	6.2E-01	2.7E+00	MG/KG	CBD-S09-SS03-1012	4/4	0.091 - 0.1	2.7E+00	6.2E+00	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	9.7E+00	2.2E+01	MG/KG	CBD-S09-SS03-1012	4/4	1 - 1	2.2E+01	1.1E+02	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.8E-01	3.0E-01	MG/KG	CBD-S09-SS02-1012	4/4	0.091 - 0.1	3.0E-01	1.0E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	3.0E-02 J	2.9E-01	MG/KG	CBD-S09-SS02-1012	4/4	0.046 - 0.05	2.9E-01	1.1E+00	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	9.0E+02	7.9E+03	MG/KG	CBD-S09-SS04-1012	4/4	50 - 50	7.9E+03	3.6E+03	NUT	N/A	N/A	NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**1.5E-01 J**	**1.1E+00**	**MG/KG**	**CBD-S09-SS04-1012**	**4/4**	**0.4 - 0.44**	**1.1E+00**	**N/A**	**3.0E-01 c**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	9.1E+00	1.8E+01	MG/KG	CBD-S09-SS02-1012	4/4	0.1 - 0.5	1.8E+01	2.7E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	6.4E-01	2.1E+00	MG/KG	CBD-S09-SS02-1012	4/4	0.091 - 0.1	2.1E+00	5.4E+00	2.3E+00 n	2.7E-02	SSL	NO	BSL
	7440-50-8	Copper	1.8E+00	1.3E+01	MG/KG	CBD-S09-SS02-1012	4/4	0.091 - 0.5	1.3E+01	4.4E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL

Table 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 9

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
	7439-89-6	Iron	3.2E+03	1.3E+04	MG/KG	CBD-S09-SS03-1012	4/4	5 - 5	1.3E+04	1.7E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	1.9E+00	2.8E+01	MG/KG	CBD-S09-SS02-1012	4/4	0.091 - 0.5	2.8E+01	9.6E+01	4.0E+02 n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	7.5E+02	1.8E+03	MG/KG	CBD-S09-SS02-1012	4/4	50 - 50	1.8E+03	1.8E+03	NUT	N/A	N/A	NO	NUT
	7439-96-5	Manganese	1.5E+01 J	6.1E+01	MG/KG	CBD-S09-SS03-1012	4/4	1 - 1	6.1E+01	2.1E+02	1.8E+02 n	2.8E+00	SSL	NO	BSL
	7439-97-6	Mercury	1.2E-02 J	4.7E-02 J	MG/KG	CBD-S09-SS02-1012	3/4	0.05 - 0.05	4.7E-02	9.9E-01	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	1.1E+00 J	9.0E+00	MG/KG	CBD-S09-SS02-1012	4/4	0.091 - 0.1	9.0E+00	1.5E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	4.7E+02	6.7E+02	MG/KG	CBD-S09-SS03-1012	4/4	50 - 50	6.7E+02	9.9E+02	NUT	N/A	N/A	NO	NUT
	7782-49-2	Selenium	2.5E-01	5.0E-01	MG/KG	CBD-S09-SS03-1012	3/4	0.091 - 0.1	5.0E-01	2.8E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	4.1E-02 J	3.9E+00 J	MG/KG	CBD-S09-SS01P-1012 CBD-S09-SS01-1012 : CBD-S09-SS02-1012 :	4/4	0.046 - 0.05	3.9E+00	8.7E+00	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-28-0	Thallium	1.5E-01	1.5E-01	MG/KG	CBD-S09-SS04-1012	3/4	0.046 - 0.05	1.5E-01	4.4E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	4.7E+00	1.7E+01	MG/KG	CBD-S09-SS03-1012	4/4	0.091 - 0.5	1.7E+01	2.6E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	8.2E+00	4.7E+01	MG/KG	CBD-S09-SS02-1012	3/4	1 - 5	4.7E+01	1.4E+02	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 3 Surface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for total xylenes used as surrogate for m- and p-xylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for n-hexane used as surrogate for methylcyclohexane.
RSL value for Mercury Chloride (and other Mercury salts) used as surrogate for mercury.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
c = carcinogenic
J = Estimated Value
L = Biased Low
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level

TABLE 2.1a
Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland
Site 9 - Surface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Semivolatile Organic Compounds (mg/kg)								
Benzo(a)pyrene	2 / 4	4.6E-02 J	CBD-S09-SS04-1012	NA	1.6E-02	NA	3E-06	NA
Benzo(b)fluoranthene	3 / 4	3.7E-01 J	CBD-S09-SS04-1012	NA	1.6E-01	NA	2E-06	NA
Metals (mg/kg)								
Chromium (hexavalent)	4 / 4	1.1E+00	CBD-S09-SS04-1012	2.3E+02	3.0E-01	0.005	4E-06	None Reported
Cumulative Corresponding Hazard Index[c]						**0.005**		
Cumulative Corresponding Cancer Risk[d]							**9E-06**	

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1×10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

Table 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 9
Site Investigation Report
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Subsurface Soil Site 9	78-93-3	2-Butanone	2.1E-03 J	1.1E-02 J	MG/KG	CBD-S09-SB01-1315	2/4	0.015 - 0.018	1.1E-02	N/A	2.7E+03 n	1.2E-01	SSL	NO	BSL
	67-64-1	Acetone	1.4E-02 J	1.4E-01	MG/KG	CBD-S09-SB01-1315	2/4	0.023 - 0.027	1.4E-01	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	75-15-0	Carbon disulfide	1.3E-02 J	1.3E-02 J	MG/KG	CBD-S09-SB01-1315	1/4	0.0015 - 0.0018	1.3E-02	N/A	7.7E+01 n	2.4E-02	SSL	NO	BSL
	127-18-4	Tetrachloroethene	1.3E-03 J	1.3E-03 J	MG/KG	CBD-S09-SB02-1315	1/4	0.0031 - 0.0035	1.3E-03	N/A	8.1E+00 n	1.8E-03	SSL	NO	BSL
	534-52-1	4,6-Dinitro-2-methylphenol	3.5E-02 J	3.5E-02 J	MG/KG	CBD-S09-SB03-1315	1/4	0.29 - 0.51	3.5E-02	N/A	5.1E-01 n	2.6E-04	SSL	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.1E-02 J	1.4E-02 J	MG/KG	CBD-S09-SB01-1315	3/4	0.058 - 0.1	1.4E-02	N/A	3.9E+01 c	1.3E+00	SSL	NO	BSL
	7429-90-5	Aluminum	5.0E+03	8.2E+03	MG/KG	CBD-S09-SB02-1315	4/4	9.3 - 250	8.2E+03	9.7E+03	7.7E+03 n	3.0E+03	SSL	NO	BBK
	7440-36-0	Antimony	3.0E-01	3.0E-01	MG/KG	CBD-S09-SB02-1315	1/4	0.1 - 0.1	3.0E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	1.1E+00	4.4E+00	MG/KG	CBD-S09-SB04-1315	4/4	0.1 - 0.1	4.4E+00	7.0E+00	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	9.9E+00	1.8E+01	MG/KG	CBD-S09-SB01-1315	4/4	0.93 - 1	1.8E+01	4.5E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.8E-01	1.4E+00	MG/KG	CBD-S09-SB03-1315	4/4	0.1 - 0.1	1.4E+00	1.1E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	2.3E-01	1.5E+00	MG/KG	CBD-S09-SB01-1315	4/4	0.05 - 0.05	1.5E+00	9.5E-01	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	1.0E+03	3.5E+03	MG/KG	CBD-S09-SB01-1315	4/4	46 - 50	3.5E+03	2.5E+03	NUT	N/A	N/A	NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**2.9E-01 J**	**9.8E-01**	**MG/KG**	**CBD-S09-SB03-1315**	**3/4**	**0.63 - 0.7**	**9.8E-01**	**N/A**	**3.0E-01 c**	**6.7E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	2.2E+01	2.8E+01	MG/KG	CBD-S09-SB01-1315 : CBD-S09-SB04-1315	4/4	0.5 - 1	2.8E+01	3.9E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	**Cobalt**	**7.6E-01**	**4.4E+01**	**MG/KG**	**CBD-S09-SB02-1315**	**4/4**	**0.1 - 1**	**4.4E+01**	**7.9E+00**	**2.3E+00 n**	**2.7E-02**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	3.0E+00	4.6E+00	MG/KG	CBD-S09-SB03-1315	4/4	0.1 - 0.1	4.6E+00	5.9E+00	3.1E+02 n	2.8E+00	SSL	NO	BSL
	7439-89-6	Iron	9.3E+03	1.7E+04	MG/KG	CBD-S09-SB03-1315	4/4	4.6 - 1200	1.7E+04	1.9E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	4.9E+00	5.0E+00	MG/KG	CBD-S09-SB01-1315 : CBD-S09-SB02-1315	4/4	0.1 - 0.1	5.0E+00	1.3E+01	4.0E+02 n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	1.4E+03	3.5E+03	MG/KG	CBD-S09-SB01-1315	4/4	46 - 50	3.5E+03	2.8E+03	NUT	N/A	N/A	NO	NUT
	7439-96-5	**Manganese**	**3.8E+00**	**2.6E+02**	**MG/KG**	**CBD-S09-SB02-1315**	**4/4**	**0.93 - 1**	**2.6E+02**	**8.0E+01**	**1.8E+02 n**	**2.8E+00**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	6.5E-03 J	1.5E-02 J	MG/KG	CBD-S09-SB02-1315	3/4	0.05 - 0.05	1.5E-02	3.8E-02	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	2.0E+00	9.8E+00	MG/KG	CBD-S09-SB01-1315	4/4	0.1 - 0.1	9.8E+00	1.6E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	1.1E+03	1.9E+03	MG/KG	CBD-S09-SB01-1315	4/4	46 - 50	1.9E+03	1.6E+03	NUT	N/A	N/A	NO	NUT
	7782-49-2	Selenium	5.9E-01	5.9E-01	MG/KG	CBD-S09-SB01-1315	1/4	0.1 - 0.1	5.9E-01	2.8E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	5.5E-02	9.6E-02	MG/KG	CBD-S09-SB01-1315	4/4	0.05 - 0.05	9.6E-02	2.1E-01	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-23-5	Sodium	1.2E+02	1.2E+02	MG/KG	CBD-S09-SB02-1315	1/4	46 - 50	1.2E+02	N/A	NUT	N/A	N/A	NO	NUT
	7440-28-0	Thallium	2.0E-01	2.5E-01	MG/KG	CBD-S09-SB02-1315	4/4	0.05 - 0.05	2.5E-01	3.2E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	7.5E+00	1.5E+01	MG/KG	CBD-S09-SB04-1315	4/4	0.1 - 1	1.5E+01	2.1E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	5.5E+01	1.5E+02	MG/KG	CBD-S09-SB03-1315	4/4	10 - 25	1.5E+02	4.3E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 3 Subsurface Soils
[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential
Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Chromium(III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for Mercury (inorganic salts) used as surrogate for mercury.
[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
L = Biased Low
c = carcinogenic
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level

TABLE 2.2a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Site 9 - Subsurface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)								
Chromium (hexavalent)	3 / 4	9.8E-01	CBD-S09-SB03-1315	2.3E+02	3.0E-01	0.004	3E-06	None Reported
Cobalt	4 / 4	4.4E+01	CBD-S09-SB02-1315	2.3E+01	4.2E+02	2	1E-07	Thyroid, Respiratory System
Manganese	4 / 4	2.6E+02	CBD-S09-SB02-1315	1.8E+03	NA	0.1	NA	Gastrointestinal System
Cumulative Corresponding Hazard Index[c]						**2**		
Cumulative Corresponding Cancer Risk[d]							**3E-06**	

Total Thyroid HI =	2
Total Respiratory System HI =	2
Total Gastrointestinal System HI =	0.1

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{-6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

Table 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 9
Site Investigation Report
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Groundwater	91-20-3	Naphthalene	5.0E-02 J	5.0E-02 J	UG/L	CBD-S09-GW01P-1012	1/1	0.06 - 0.06	5.0E-02	N/A	1.7E-01 c	N/A	N/A	NO	BSL
Site 9	7429-90-5	Aluminum	1.1E+03 J	1.1E+03 J	UG/L	CBD-S09-GW01P-1012	1/1	100 - 100	1.1E+03	N/A	2.0E+03 c	10	MCL	NO	BSL
	7440-38-2	**Arsenic**	**5.4E-01 J**	**5.4E-01 J**	**UG/L**	**CBD-S09-GW01P-1012**	**1/1**	**1 - 1**	5.4E-01	**N/A**	**5.2E-02 c**	**1.0E+01**	**MCL**	**YES**	**ASL**
	7440-39-3	Barium	6.2E+01	6.2E+01	UG/L	CBD-S09-GW01P-1012	1/1	10 - 10	6.2E+01	N/A	3.8E+02 n	2.0E+03	MCL	NO	BSL
	7440-41-7	Beryllium	2.0E-01 J	2.0E-01 J	UG/L	CBD-S09-GW01P-1012	1/1	1 - 1	2.0E-01	N/A	2.5E+00 n	4.0E+00	MCL	NO	BSL
	7440-43-9	**Cadmium**	**1.3E+00**	**1.3E+00**	**UG/L**	**CBD-S09-GW01P-1012**	**1/1**	**0.2 - 0.2**	1.3E+00	**N/A**	**9.2E-01 n**	**5.0E+00**	**MCL**	**YES**	**ASL**
	7440-70-2	Calcium	3.4E+04 J	3.4E+04 J	UG/L	CBD-S09-GW01P-1012	1/1	500 - 500	3.4E+04	N/A	NUT	N/A	N/A	NO	NUT
	7440-47-3	Chromium	7.9E+00 J	7.9E+00 J	UG/L	CBD-S09-GW01P-1012	1/1	1 - 1	7.9E+00	N/A	2.2E+03 n	1.0E+02	MCL	NO	BSL
	7440-48-4	**Cobalt**	**3.1E+00**	**3.1E+00**	**UG/L**	**CBD-S09-GW01P-1012**	**1/1**	**1 - 1**	3.1E+00	**N/A**	**6.0E-01 n**	**N/A**	**N/A**	**YES**	**ASL**
	7440-50-8	Copper	1.3E+01 J	1.3E+01 J	UG/L	CBD-S09-GW01P-1012	1/1	1 - 1	1.3E+01	N/A	8.0E+01 c	N/A	N/A	NO	BSL
	7439-89-6	**Iron**	**1.8E+03 J**	**1.8E+03 J**	**UG/L**	**CBD-S09-GW01P-1012**	**1/1**	**10 - 10**	**1.8E+03**	**N/A**	**1.4E+03 n**	**3.0E+02**	**SMCL**	**YES**	**ASL**
	7439-92-1	Lead	9.3E-01 J	9.3E-01 J	UG/L	CBD-S09-GW01P-1012	1/1	1 - 1	9.3E-01	N/A	1.5E+01 n	1.5E+01	MCL	NO	BSL
	7439-95-4	Magnesium	6.3E+03 J	6.3E+03 J	UG/L	CBD-S09-GW01P-1012	1/1	500 - 500	6.3E+03	N/A	NUT	N/A	N/A	NO	NUT
	7439-96-5	**Manganese**	**1.1E+02 J**	**1.1E+02 J**	**UG/L**	**CBD-S09-GW01P-1012**	**1/1**	**10 - 10**	**1.1E+02**	**N/A**	**4.3E+01 n**	**5.0E+01**	**SMCL**	**YES**	**ASL**
	7440-02-0	Nickel	1.5E+01 J	1.5E+01 J	UG/L	CBD-S09-GW01P-1012	1/1	1 - 1	1.5E+01	N/A	3.9E+01 n	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.0E+04	1.0E+04	UG/L	CBD-S09-GW01P-1012	1/1	100 - 100	1.0E+04	N/A	NUT	N/A	N/A	NO	NUT
	7440-23-5	Sodium	3.2E+04	3.2E+04	UG/L	CBD-S09-GW01P-1012	1/1	500 - 500	3.2E+04	N/A	NUT	N/A	N/A	NO	NUT
	7440-28-0	**Thallium**	**2.9E-01 J**	**2.9E-01 J**	**UG/L**	**CBD-S09-GW01P-1012**	**1/1**	**1 - 1**	2.9E-01	**N/A**	**2.0E-02 n**	**2.0E+00**	**MCL**	**YES**	**ASL**
	7440-62-2	Vanadium	2.9E+00 J	2.9E+00 J	UG/L	CBD-S09-GW01P-1012	1/1	1 - 1	2.9E+00	N/A	8.6E+00 n	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.
For metals, total results for sample all samples were used.
[2] Maximum concentration is used for screening.
[3] Background values not available.
[4] Oak Ridge National Laboratory (ORNL). November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Tap Water RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). [Online].
Available: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Chromium(III) used as surrogate for chromium.
The tap water value of 15 ug/L for lead is the action level provided in the Drinking Water Regulations and Health Advisories.
[5] Drinking water Maximum Contaminant Level (MCL) (USEPA, 2009).
[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
c = carcinogenic
J = Estimated Value
MCL = Maximum Contaminant Level
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Levels
SMCL = Maximum Contaminant Level, Secondary Drinking Water Standards
µg/L - microgram per liter

TABLE 2.3a
Step 2 Groundwater Screening - Risk Ratio, Maximum Detected Concentration
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland
Site 9 - Groundwater

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Tap Water RSL HQ=1	Carcinogenic Tap Water RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (µg/L)								
Arsenic	1 / 1	5.4E-01 J	CBD-S09-GW01P-1012	6.0E+00	5.2E-02	0.09	1E-05	Skin, Vascular
Cadmium	1 / 1	1.3E+00	CBD-S09-GW01P-1012	9.2E+00	NA	0.1	NA	Kidney
Cobalt	1 / 1	3.1E+00	CBD-S09-GW01P-1012	6.0E+00	NA	0.5	NA	Thyroid
Iron	1 / 1	1.8E+03 J	CBD-S09-GW01P-1012	1.4E+04	NA	0.1	NA	Gastrointestinal System
Manganese	1 / 1	1.1E+02 J	CBD-S09-GW01P-1012	4.3E+02	NA	0.3	NA	Nervous System
Thallium	1 / 1	2.9E-01 J	CBD-S09-GW01P-1012	2.0E-01	NA	**1**	NA	Hair
Cumulative Corresponding Hazard Index[c]						**3**		
Cumulative Corresponding Cancer Risk[d]							1E-05	

Total Kidney HI =	0.1
Total Thyroid HI =	0.5
Total Hair HI =	**1**
Total Skin System HI =	0.1
Total Vascular System HI =	0.1
Total Gastrointestinal System HI =	0.1
Total Nervous System HI =	0.3

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

J = Estimated Value

µg/L = micrograms per liter

NA = Not available/not applicable

RSL = Regional Screening Levels

Table 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SITE 9

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air (Residential)

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background Value [3]	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Groundwater Site 9	91-20-3	Naphthalene	5.0E-02 J	5.0E-02 J	UG/L	CBD-S09-GW01P-1012	1/1	0.06 - 0.06	5.0E-02	N/A	1.1E+01 C	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Vapor Intrusion Groundwater Screening Levels. See Table 2.4 Supplement A
SL based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens

[5] Drinking water Maximum Contaminant Level (MCL) (USEPA, 2009).

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value

L = Biased Low

MCL = Maximum Contaminant Level

N = Noncarcinogenic

N/A = Not available or Not applicable

SL = Screening Levels

µg/L - microgram per liter

Table 2.4 Supplement A
OSWER VAPOR INTRUSION ASSESSMENT
Vapor Intrusion Screening Level (VISL) Calculator Version 3.4, November 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	0.1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (°C)	Tgw	14	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

	CAS	Chemical Name	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source?	Target Indoor Air Conc. @ TCR = 1E-06 or THQ = 0.1	Toxicity Basis	Target Sub-Slab and Exterior Soil Gas Conc. @ TCR = 1E-06 or THQ = 0.1	Target Ground Water Conc. @ TCR = 1E-06 or THQ = 0.1	Is Target Ground Water Conc. < MCL?	Temperature for Groundwater Vapor Conc.	Lower Explosive Limit**	LEL Source	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator	Target Indoor Air Conc. for Carcinogens @ TCR = 1E-06	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 0.1
			Cvp > Cia,target/AFss?	Cvp > Cia,target/AFgw?	MIN(Cia,c;Cia,nc)		Csg	Cgw	Cgw<MCL?	Tgw or 25	LEL		IUR		RfC		i	Cia,c	Cia,nc
			Yes/No	Yes/No	(ug/m^3)	C/NC	(ug/m^3)	(ug/L)	Yes/No (MCL ug/L)	C	(% by vol)		(ug/m^3)$^{-1}$		(mg/m^3)			(ug/m^3)	(ug/m^3)
x	91-20-3	Naphthalene	Yes	Yes	8.3E-02	C	2.8E+00	1.1E+01	--	14	0.9	N	3.40E-05	CA	3.00E-03	I		8.3E-02	3.1E-01

x
x **Notes:**
x
x (1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E5) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R	70	ATc_C	70	ATc	70
Averaging time for non-carcinogens	(yrs)	ATnc_R	26	ATnc_C	25	ATnc	26
Exposure duration	(yrs)	ED_R	26	ED_C	25	ED	26
Exposure frequency	(days/yr)	EF_R	350	EF_C	250	EF	350
Exposure time	(hr/day)	ET_R	24	ET_C	8	ET	24

x (2) **Generic Attenuation Factors:**

Source Medium of Vapors	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E5) Symbol	Selected Value
Groundwater	AFgw_R	0.001	AFgw_C	0.001	AFgw	0.001
Sub-Slab and Exterior Soil Gas	AFss_R	0.03	AFss_C	0.03	AFss	0.03

x
x (3) **Formulas**
x Cia, target = MIN(Cia,c; Cia,nc)
x Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
x Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)
x
x (4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E5) Symbol	Selected Value
	mIURTCE_R	1.00E-06	mIURTCE_C	0.00E+00	mIURTCE	1.00E-06
	IURTCE_R	3.10E-06	IURTCE_C	4.10E-06	IURTCE	3.10E-06

x
x Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:
x
x Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration (years)	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 30 years	10	1

x
x **Mutagenic-mode-of-action (MMOA) adjustment factor** 72 This factor is used in the equations for mutagenic chemicals.
x
x Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.
x
x **Notation:**
x NVT = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated medium
x C = Carcinogenic
x NC = Non-carcinogenic
x I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
x P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
x A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
x CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at:
x H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
x S = See RSL User Guide, Section 5
x X = PPRTV Appendix
x E = The Engineering ToolBox. Available online at http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.html
x N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online at:
x M = Chemical-specific MSDS
x Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
x VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
x TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
x Yellow highlighting indicates site-specific parameters that may be edited by the user.
x Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
x **Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explode.

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - AOC C

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Surface Soil AOC C	78-93-3	2-Butanone	3.4E-03 J	2.3E-02 L	MG/KG	CBD-AOC-SS02-1012	5/5	0.0088 - 0.013	2.3E-02	N/A	2.7E+03 n	1.2E-01	SSL	NO	BSL
	591-78-6	2-Hexanone	6.4E-04 J	1.4E-03 L	MG/KG	CBD-AOC-SS02-1012	4/5	0.0088 - 0.013	1.4E-03	N/A	2.0E+01 n	8.8E-04	SSL	NO	BSL
	67-64-1	Acetone	4.5E-01 J	7.7E-01 J	MG/KG	CBD-AOC-SS01-1012	4/5	0.013 - 1.1	7.7E-01	N/A	6.1E+03 n	2.9E-01	SSL	NO	BSL
	m&pXYLENE	m- and p-Xylene	4.8E-04 J	4.8E-04 J	MG/KG	CBD-AOC-SS01-1012	1/5	0.0018 - 0.0025	4.8E-04	N/A	5.8E+01 n	N/A	N/A	NO	BSL
	108-88-3	Toluene	7.7E-03 J	2.2E-02 L	MG/KG	CBD-AOC-SS04-1012	4/5	0.0018 - 0.0025	2.2E-02	N/A	4.9E+02 n	7.6E-02	SSL	NO	BSL
	83-32-9	Acenaphthene	1.4E-03 J	1.4E-03 J	MG/KG	CBD-AOC-SS03-1012	1/5	0.018 - 0.019	1.4E-03	N/A	3.6E+02 n	5.5E-01	SSL	NO	BSL
	120-12-7	Anthracene	1.8E-03	1.8E-03	MG/KG	CBD-AOC-SS03-1012	1/5	0.018 - 0.019	1.8E-03	N/A	1.8E+03 n	5.8E+00	SSL	NO	BSL
	100-52-7	Benzaldehyde	1.9E-02 L	2.0E-01 L	MG/KG	CBD-AOC-SS02-1012	2/4	0.092 - 0.096	2.0E-01	N/A	7.8E+02 n	4.3E-02	SSL	NO	BSL
	56-55-3	Benzo(a)anthracene	4.1E-03 J	4.1E-03 J	MG/KG	CBD-AOC-SS02-1012	1/5	0.018 - 0.019	4.1E-03	N/A	1.6E-01 c	4.2E-03	SSL	NO	BSL
	205-99-2	Benzo(b)fluoranthene	2.2E-03 J	2.2E-03 J	MG/KG	CBD-AOC-SS02-1012	1/5	0.018 - 0.019	2.2E-03	N/A	1.6E-01 c	4.1E-02	SSL	NO	BSL
	131-11-3	Dimethyl phthalate	2.2E-03 J	2.2E-03 J	MG/KG	CBD-AOC-SS02-1012	1/5	0.018 - 0.019	2.2E-03	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	5.6E-03 J	5.6E-03 J	MG/KG	CBD-AOC-SS02-1012	1/5	0.018 - 0.019	5.6E-03	N/A	2.4E+02 n	8.9E+00	SSL	NO	BSL
	85-01-8	Phenanthrene	1.9E-03 J	1.9E-03 J	MG/KG	CBD-AOC-SS02-1012	1/5	0.018 - 0.019	1.9E-03	N/A	1.8E+03 n	N/A	N/A	NO	BSL
	129-00-0	Pyrene	6.0E-03 J	6.0E-03 J	MG/KG	CBD-AOC-SS02-1012	1/5	0.018 - 0.019	6.0E-03	N/A	1.8E+02 n	1.3E+00	SSL	NO	BSL
	7429-90-5	Aluminum	9.1E+03	1.3E+04	MG/KG	CBD-AOC-SS05-1012	5/5	9.1 - 10	1.3E+04	1.7E+04	7.7E+03 n	3.0E+03	SSL	NO	BBK
	7440-36-0	Antimony	8.5E-02 J	2.3E-01	MG/KG	CBD-AOC-SS01-1012	5/5	0.1 - 0.1	2.3E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	1.9E+00	3.6E+00	MG/KG	CBD-AOC-SS05-1012	5/5	0.092 - 0.1	3.6E+00	1.0E+01	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	3.3E+01	5.5E+01	MG/KG	CBD-AOC-SS05-1012	5/5	0.91 - 1	5.5E+01	6.7E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	2.6E-01	4.4E-01	MG/KG	CBD-AOC-SS01P-1012 : CBD-AOC-SS05-1012	5/5	0.092 - 0.1	4.4E-01	7.6E-01	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	3.3E-02 J	8.7E-02	MG/KG	CBD-AOC-SS01-1012	5/5	0.046 - 0.05	8.7E-02	1.6E+00	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	1.6E+02	3.4E+02	MG/KG	CBD-AOC-SS02-1012	5/5	47 - 50	3.4E+02	3.0E+03	NUT	N/A	N/A	NO	NUT
	7440-47-3	Chromium	7.9E+00	1.4E+01	MG/KG	CBD-AOC-SS05-1012	5/5	0.1 - 0.5	1.4E+01	4.2E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	Cobalt	3.3E+00	4.0E+00	MG/KG	CBD-AOC-SS05-1012	5/5	0.092 - 0.1	4.0E+00	4.8E+00	2.3E+00 n	2.7E-02	SSL	NO	BBK
	7440-50-8	Copper	2.3E+00	3.6E+00	MG/KG	CBD-AOC-SS05-1012	5/5	0.092 - 0.1	3.6E+00	2.1E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	57-12-5	Cyanide	2.7E-02 J	5.4E-02 J	MG/KG	CBD-AOC-SS01P-1012	2/5	0.11 - 0.11	5.4E-02	N/A	2.7E-01 n	1.5E-03	SSL	NO	BSL
	7439-89-6	Iron	8.7E+03	1.5E+04	MG/KG	CBD-AOC-SS05-1012	5/5	4.6 - 5	1.5E+04	7.1E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	6.6E+00	2.0E+01	MG/KG	CBD-AOC-SS01-1012	5/5	0.092 - 0.5	2.0E+01	6.2E+01	4.0E+02 n	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	8.2E+02	1.3E+03	MG/KG	CBD-AOC-SS05-1012	5/5	46 - 50	1.3E+03	1.2E+03	NUT	N/A	N/A	NO	NUT
	7439-96-5	Manganese	6.5E+01	1.3E+02	MG/KG	CBD-AOC-SS01-1012	5/5	0.91 - 1	1.3E+02	3.3E+02	1.8E+02 n	2.8E+00	SSL	NO	BSL
	7439-97-6	Mercury	6.4E-03 J	1.9E-02 J	MG/KG	CBD-AOC-SS01-1012 : CBD-AOC-SS01P-1012	5/5	0.05 - 0.05	1.9E-02	1.1E-01	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	5.3E+00	6.8E+00	MG/KG	CBD-AOC-SS05-1012	5/5	0.092 - 0.1	6.8E+00	1.0E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	4.6E+02	6.5E+02	MG/KG	CBD-AOC-SS05-1012	5/5	46 - 50	6.5E+02	1.3E+03	NUT	N/A	N/A	NO	NUT
	7782-49-2	Selenium	3.1E-01	3.7E-01	MG/KG	CBD-AOC-SS01P-1012	3/5	0.092 - 0.1	3.7E-01	2.4E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	2.7E-02 J	4.4E-02 J	MG/KG	CBD-AOC-SS01-1012	5/5	0.046 - 0.05	4.4E-02	1.4E-01	3.9E+01 n	8.0E-02	SSL	NO	BSL

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - AOC C

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
	7440-28-0	Thallium	9.9E-02	1.6E-01	MG/KG	CBD-AOC-SS05-1012	5/5	0.046 - 0.05	1.6E-01	3.3E-01	7.8E-02 n	1.4E-03	SSL	NO	BBK
	7440-62-2	Vanadium	1.3E+01	2.4E+01	MG/KG	CBD-AOC-SS05-1012	5/5	0.46 - 0.5	2.4E+01	4.3E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	2.3E+01	2.4E+01	MG/KG	CBD-AOC-SS01P-1012	2/5	4.6 - 5	2.4E+01	6.6E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 2 Surface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium (III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for total xylenes used as surrogate for m- and p-xylene.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
L = Biased Low
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - AOC C

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection
Subsurface Soil AOC C	78-93-3	2-Butanone	3.2E-03 J	3.2E-03 J	MG/KG	CBD-AOC-SB01-2830	1/5	0.01 - 0.014	3.2E-03	N/A	2.7E+03 n	1.2E-01	SSL	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthala	5.3E-02	5.3E-02	MG/KG	CBD-AOC-SB05-2729	1/5	0.037 - 0.039	5.3E-02	N/A	3.9E+01 c	1.3E+00	SSL	NO	BSL
	7429-90-5	Aluminum	2.0E+03	1.1E+04	MG/KG	CBD-AOC-SB01-2830	5/5	9.1 - 1000	1.1E+04	2.5E+04	7.7E+03 n	3.0E+03	SSL	NO	BBK
	7440-36-0	Antimony	1.2E-01	5.9E-01	MG/KG	CBD-AOC-SB01-2830	5/5	0.1 - 0.1	5.9E-01	N/A	3.1E+00 n	3.5E-02	SSL	NO	BSL
	7440-38-2	Arsenic	1.4E+00	5.0E+00	MG/KG	CBD-AOC-SB01-2830	5/5	0.094 - 0.1	5.0E+00	1.1E+01	6.8E-01 c	1.5E-03	SSL	NO	BBK
	7440-39-3	Barium	8.3E+00	7.0E+01	MG/KG	CBD-AOC-SB05-2729	5/5	0.91 - 1	7.0E+01	6.8E+01	1.5E+03 n	1.6E+01	SSL	NO	BSL
	7440-41-7	Beryllium	1.5E+00	3.9E+00	MG/KG	CBD-AOC-SB01-2830	5/5	0.094 - 0.1	3.9E+00	1.0E+00	1.6E+01 n	1.9E+00	SSL	NO	BSL
	7440-43-9	Cadmium	2.6E-01	2.5E+00	MG/KG	CBD-AOC-SB05-2729	5/5	0.047 - 0.05	2.5E+00	1.9E-01	7.1E+00 n	6.9E-02	SSL	NO	BSL
	7440-70-2	Calcium	1.4E+02	8.9E+02	MG/KG	CBD-AOC-SB05-2729	3/5	50 - 50	8.9E+02	5.1E+02	NUT	N/A	N/A	NO	NUT
	18540-29-9	Chromium (hexavalent)	2.6E-01 J	2.6E-01 J	MG/KG	CBD-AOC-SB01-2830	1/1	0.45 - 0.45	2.6E-01	N/A	3.0E-01 c	6.7E-04	SSL	NO	BSL
	7440-47-3	Chromium	7.7E+00	1.4E+01	MG/KG	CBD-AOC-SB04-2628	5/5	0.094 - 0.5	1.4E+01	3.9E+01	1.2E+04 n	4.0E+06	SSL	NO	BSL
	7440-48-4	**Cobalt**	**7.9E+00**	**1.2E+02**	**MG/KG**	**CBD-AOC-SB02-2830**	**5/5**	**0.1 - 2.4**	**1.2E+02**	**6.8E+00**	**2.3E+00 n**	**2.7E-02**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.5E+00	4.0E+00	MG/KG	CBD-AOC-SB02-2830	5/5	0.094 - 0.1	4.0E+00	1.0E+01	3.1E+02 n	2.8E+00	SSL	NO	BSL
	57-12-5	Cyanide	1.6E-01	1.6E-01	MG/KG	CBD-AOC-SB02-2830	1/5	0.11 - 0.12	1.6E-01	N/A	2.7E-01 n	1.5E-03	SSL	NO	BSL
	7439-89-6	Iron	4.2E+03	1.3E+04	MG/KG	CBD-AOC-SB04-2628	5/5	4.6 - 500	1.3E+04	3.5E+04	5.5E+03 n	3.5E+01	SSL	NO	BBK
	7439-92-1	Lead	1.4E+00	2.2E+00	MG/KG	CBD-AOC-SB02-2830 : CBD-AOC-SB04-2628	5/5	0.094 - 0.1	2.2E+00	1.4E+01	4.0E+02 NL	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	4.7E+02	7.6E+02	MG/KG	CBD-AOC-SB01-2830	5/5	46 - 50	7.6E+02	2.3E+03	NUT	N/A	N/A	NO	NUT
	7439-96-5	**Manganese**	**9.8E+01**	**6.7E+02**	**MG/KG**	**CBD-AOC-SB02-2830**	**5/5**	**0.91 - 1**	**6.7E+02**	**5.5E+02**	**1.8E+02 n**	**2.8E+00**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	8.5E-03 J	8.5E-03 J	MG/KG	CBD-AOC-SB01-2830	1/5	0.05 - 0.05	8.5E-03	6.0E-02	2.3E+00 n	3.3E-03	SSL	NO	BSL
	7440-02-0	Nickel	1.1E+01	4.9E+01	MG/KG	CBD-AOC-SB02-2830	5/5	0.5 - 0.94	4.9E+01	1.1E+01	1.5E+02 n	2.6E+00	SSL	NO	BSL
	7440-09-7	Potassium	3.2E+02	4.9E+02	MG/KG	CBD-AOC-SB01-2830	5/5	46 - 50	4.9E+02	1.6E+03	NUT	N/A	N/A	NO	NUT
	7782-49-2	Selenium	4.5E-01	1.3E+00	MG/KG	CBD-AOC-SB01-2830	2/5	0.094 - 0.1	1.3E+00	2.5E+00	3.9E+01 n	5.2E-02	SSL	NO	BSL
	7440-22-4	Silver	2.2E-02 J	2.5E-02 J	MG/KG	CBD-AOC-SB03-2830	2/5	0.047 - 0.05	2.5E-02	5.1E-02	3.9E+01 n	8.0E-02	SSL	NO	BSL
	7440-23-5	Sodium	1.9E+01 J	1.9E+01 J	MG/KG	CBD-AOC-SB04-2628	1/5	46 - 50	1.9E+01	N/A	NUT	N/A	N/A	NO	NUT
	7440-28-0	**Thallium**	**1.8E-01**	**9.2E-01**	**MG/KG**	**CBD-AOC-SB02-2830**	**5/5**	**0.047 - 0.05**	**9.2E-01**	**4.7E-01**	**7.8E-02 n**	**1.4E-03**	**SSL**	**YES**	**ASL**
	7440-62-2	Vanadium	6.3E+00	9.2E+00	MG/KG	CBD-AOC-SB01-2830	5/5	0.094 - 0.5	9.2E+00	3.8E+01	3.9E+01 n	8.6E+00	SSL	NO	BSL
	7440-66-6	Zinc	1.4E+02	1.4E+02	MG/KG	CBD-AOC-SB02-2830	1/5	5 - 25	1.4E+02	3.9E+01	2.3E+03 n	3.7E+01	SSL	NO	BSL

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - AOC C

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential [5] ARAR/TBC Source	COPC Flag	Rationale for [6] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 2 Subsurface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/
RSL value for Chromium (III) used as surrogate for chromium.
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Risk-based Soil Screening Levels. ORNL. November 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available Online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/

[6] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
COPC = Chemical of Potential Concern
c = carcinogenic
J = Estimated Value
MG/KG = milligrams per kilogram
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
SSL = Soil Screening Level

TABLE 2.2a

Step 2 Soil Screening - Risk Ratio, Maximum Detected Concentration

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

AOC C - Subsurface Soil

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier)	Sample Location of Maximum Detected Concentration	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)								
Cobalt	5 / 5	1.2E+02	CBD-AOC-SB02-2830	2.3E+01	4.2E+02	5	3E-07	Thyroid, Respiratory System
Manganese	5 / 5	6.7E+02	CBD-AOC-SB02-2830	1.8E+03	N/A	0.4	NA	Nervous System
Thallium	5 / 5	9.2E-01	CBD-AOC-SB02-2830	7.8E-01	N/A	1	N/A	Hair
Cumulative Corresponding Hazard Index[c]						**7**		
Cumulative Corresponding Cancer Risk[d]							**3E-07**	

Total Nervous System HI =	0.4
Total Thyroid HI =	5
Total Respiratory System HI =	5
Total Hair System HI =	1

Notes:

[a] Corresponding Hazard Index equals maximum detected concentration divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.

[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^{6} divided by the carcinogenic RSL.

[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.

[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05, otherwise, constituent not selected as COPC.

Constituents selected as COPCs are indicated by shading.

COPC = Constituent of Potential Concern

HI = Hazard Index

mg/kg = milligrams per kilogram

NA = Not available/not applicable

RSL = Regional Screening Levels

Table 2.2b
Step 3 Soil Screening - Risk Ratio, 95% UCL
Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland
AOC C - Subsurface Soil

Analyte	Detection Frequency	95% UCL		95% UCL Rationale	Noncarcinogenic Residential Soil RSL HQ=1	Carcinogenic Residential Soil RSL ELCR = 1.0E-6	Corresponding Hazard Index[a]	Corresponding Cancer Risk[b]	Target Organ
Metals (mg/kg)									
Cobalt	5 / 5	8.9E+01	95% Student's-t	1, 2, 3	2.3E+01	4.2E+02	4	2E-07	Thyroid, Respiratory System
Thallium	5 / 5	7.4E-01	95% Student's-t	1, 2, 3	7.8E-01	N/A	0.9	N/A	Hair
Cumulative Corresponding Hazard Index[c]							**5**		
Cumulative Corresponding Cancer Risk[d]								**2E-07**	

Total Thyroid HI =	4
Total Respiratory System HI =	4
Total Hair System HI =	0.9

[a] Corresponding Hazard Index equals 95% UCL divided by the noncarcinogenic RSL divided by the acceptable hazard level of 1.
[b] Corresponding Cancer Risk equals maximum detected concentration multiplied by the acceptable risk level of 1 x 10^-6 divided by the carcinogenic RSL.
[c] Cumulative Corresponding Hazard Index equals sum of Corresponding Hazard Indices for each constituent.
[d] Cumulative Corresponding Cancer Risk equals sum of Corresponding Cancer Risks for each constituent.

Constituent selected as COPC if it contributes to an overall Hazard Index by target organ greater than 0.5 or Cumulative Corresponding Cancer Risk greater than 5E-05,

Constituents selected as COPCs are indicated by shading.

mg/kg = milligrams per kilogram
HI = Hazard Index
NA = Not available/not applicable
RSL = Regional Screening Levels
UCL = Upper Confidence Limit

ProUCL, Version 5.0 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. September 2013. Prepared by Lockheed Martin Environmental Services).

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.

Table 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - AOC D

Site Investigation Report

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Surface Soil	**7439-92-1**	**Lead**	**1.2E+03**	**3.0E+03**	**MG/KG**	**CBD-AOD-SS02-1012**	**4/4**	**19 - 50**	**3.0E+03**	**9.6E+01**	**4.0E+02 n**	**N/A**	**N/A**	**YES**	**ASL**

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Soil Background Study Report for Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Bay, MD (Tetra Tech, March 2015)
95% Upper Tolerance Limit Background for Group 3 Surface Soils

[4] Oak Ridge National Laboratory (ORNL). November, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Superfund Sites [Online]. Residential Soil RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens).
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, USEPA, July 14, 1994.

[5] Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
n = noncarcinogenic
N/A = Not available or Not applicable
RSL = Regional Screening Level
MG/KG = milligrams per kilogram

Appendix F
Ecological Risk Screening Tables

TABLE 1

Surface Soil Screening Values

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Screening Value and Source	
Inorganics (MG/KG)		
Aluminum	NSV	--
Antimony	78.0	USEPA 2005
Arsenic	18	USEPA 2005
Barium	330	USEPA 2005
Beryllium	40.0	USEPA 2005
Cadmium	32.0	USEPA 2005
Chromium (hexavalent)	0.4	Efroymson et. al 1997a
Chromium	0.0075	USEPA 1995
Cobalt	13.0	USEPA 2005
Copper	70.0	USEPA 2007
Cyanide	0.0050	USEPA 1995
Iron	NSV	--
Lead	120.0	USEPA 2005
Manganese	220	USEPA 2007
Mercury	0.058	USEPA 1995
Nickel	38.0	USEPA 2007
Selenium	0.52	USEPA 2007
Silver	560	USEPA 2006
Thallium	0.0010	USEPA 1995
Vanadium	0.50	USEPA 1995
Zinc	120.0	USEPA 2007
Polychlorinated Biphenyls (UG/KG)		
Aroclor-1016	100	USEPA 1995
Aroclor-1221	100	USEPA 1995
Aroclor-1232	100	USEPA 1995
Aroclor-1242	100	USEPA 1995
Aroclor-1248	100	USEPA 1995
Aroclor-1254	100	USEPA 1995
Aroclor-1260	100	USEPA 1995
Semivolatile Organic Compounds (UG/KG)		
1,1-Biphenyl	600	Efroymson et al. 1997b
1,2,4,5-Tetrachlorobenzene	NSV	--
2,2'-Oxybis(1-chloropropane)	NSV	--
2,3,4,6-Tetrachlorophenol	NSV	--
2,4,5-Trichlorophenol	100	USEPA 1995
2,4,6-Trichlorophenol	100	USEPA 1995
2,4-Dichlorophenol	100	USEPA 1995
2,4-Dimethylphenol	100	USEPA 1995
2,4-Dinitrophenol	100	USEPA 1995
2,4-Dinitrotoluene	NSV	--
2,6-Dinitrotoluene	NSV	--
2-Chloronaphthalene	NSV	--
2-Chlorophenol	100	USEPA 1995
2-Methylnaphthalene	3240	USEPA 2003b
2-Methylphenol	100	USEPA 1995
2-Nitroaniline	NSV	--
2-Nitrophenol	NSV	--
3,3'-Dichlorobenzidine	NSV	--
3-Nitroaniline	NSV	--
4,6-Dinitro-2-methylphenol	NSV	--
4-Bromophenyl-phenylether	NSV	--
4-Chloro-3-methylphenol	NSV	--
4-Chloroaniline	NSV	--
4-Chlorophenyl-phenylether	NSV	--
4-Methylphenol	100	USEPA 1995
4-Nitroaniline	NSV	--
4-Nitrophenol	100	USEPA 1995
Acenaphthene	100	USEPA 1995
Acenaphthylene	100	USEPA 1995
Acetophenone	NSV	--

NSV - No Screening Value

1 - Stated criteria compared to mean site-specific soil pH

TABLE 1

Surface Soil Screening Values

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Screening Value and Source	
Anthracene	100	USEPA 1995
Atrazine	NSV	--
Benzaldehyde	NSV	--
Benzo(a)anthracene	100	USEPA 1995
Benzo(a)pyrene	100	USEPA 1995
Benzo(b)fluoranthene	100	USEPA 1995
Benzo(g,h,i)perylene	100	USEPA 1995
Benzo(k)fluoranthene	100	USEPA 1995
bis(2-Chloroethoxy)methane	NSV	--
bis(2-Chloroethyl)ether	NSV	--
bis(2-Ethylhexyl)phthalate	NSV	--
Butylbenzylphthalate	NSV	--
Caprolactam	NSV	--
Carbazole	NSV	--
Chrysene	100	USEPA 1995
Dibenz(a,h)anthracene	100	USEPA 1995
Dibenzofuran	NSV	--
Diethylphthalate	1,000	Efroymson et al. 1997b
Dimethyl phthalate	2,000	Efroymson et al. 1997a
Di-n-butylphthalate	200,000	Efroymson et al. 1997b
Di-n-octylphthalate	NSV	--
Fluoranthene	100	USEPA 1995
Fluorene	100	USEPA 1995
Hexachlorobenzene	1,000,000	Efroymson et al. 1997a
Hexachlorobutadiene	NSV	--
Hexachlorocyclopentadiene	100	Efroymson et al. 1997b
Hexachloroethane	NSV	--
Indeno(1,2,3-cd)pyrene	100	USEPA 1995
Isophorone	NSV	--
Naphthalene	100	USEPA 1995
Nitrobenzene	400	Efroymson et al. 1997a
n-Nitroso-di-n-propylamine	NSV	--
n-Nitrosodiphenylamine	200	Efroymson et al. 1997a
PAHs, LMW	29,000	USEPA 2007
PAHs, HMW	1,100	USEPA 2007
Pentachlorophenol	5	USEPA 2007
Phenanthrene	100	USEPA 1995
Phenol	100	USEPA 1995
Pyrene	100	USEPA 1995
Volatile Organic Compounds (UG/KG)		
1,1,1-Trichloroethane	300	USEPA 1995
1,1,2,2-Tetrachloroethane	300	USEPA 1995
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113	NSV	--
1,1,2-Trichloroethane	300	USEPA 1995
1,1-Dichloroethane	300	USEPA 1995
1,1-Dichloroethene	NSV	--
1,2,3-Trichlorobenzene	NSV	--
1,2,4-Trichlorobenzene	100	USEPA 1995
1,2-Dibromo-3-chloropropane	NSV	--
1,2-Dibromoethane	5,000	USEPA 1995
1,2-Dichlorobenzene	100	USEPA 1995
1,2-Dichloroethane	870,000	USEPA 1995
1,2-Dichloropropane	300	USEPA 1995
1,3-Dichlorobenzene	NSV	--
1,4-Dichlorobenzene	100	USEPA 1995
2-Butanone	NSV	--
2-Hexanone	12,600	USEPA 2003b
4-Methyl-2-pentanone	100,000	USEPA 1995
Acetone	NSV	--
Benzene	100	USEPA 1995
Bromochloromethane	NSV	--

NSV - No Screening Value

1 - Stated criteria compared to mean site-specific soil pH

TABLE 1

Surface Soil Screening Values

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Screening Value and Source	
Bromodichloromethane	450,000	USEPA 1995
Bromoform	1,147,000	USEPA 1995
Bromomethane	NSV	--
Carbon disulfide	94.1	USEPA 2003b
Carbon tetrachloride	300	USEPA 1995
Chlorobenzene	100	USEPA 1995
Chloroethane	NSV	--
Chloroform	300	USEPA 1995
Chloromethane	NSV	--
cis-1,2-Dichloroethene	300	USEPA 1995
cis-1,3-Dichloropropene	300	USEPA 1995
Cyclohexane	100	USEPA 2000
Dibromochloromethane	NSV	--
Dichlorodifluoromethane (Freon-12)	NSV	--
Ethylbenzene	100	USEPA 1995
Isopropylbenzene	NSV	--
m- and p-Xylene	NSV	--
Methyl acetate	NSV	--
Methylcyclohexane	NSV	--
Methylene chloride	300	USEPA 1995
Methyl-tert-butyl ether (MTBE)	NSV	--
o-Xylene	NSV	--
Styrene	100	USEPA 1995
Tetrachloroethene	300	USEPA 1995
Toluene	100	USEPA 1995
trans-1,2-Dichloroethene	300	USEPA 1995
trans-1,3-Dichloropropene	300	USEPA 1995
Trichloroethene	300	USEPA 1995
Trichlorofluoromethane(Freon-11)	16,400	USEPA 2003b
Vinyl chloride	300	USEPA 1995

Source Citations:

Efroymson, R.A., M.E. Will and G.W. Suter. 1997a. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision. Oak Ridge National Laboratory (ORNL). ES/ER/TM-126/R2. November 1997.

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U.S. Environmental Protection Agency (USEPA). 2005. Ecological Soil Screening Levels for Antimony, Arsenic, Barium, Beryllium, Cadmium, Cobalt and Lead: http://www.epa.gov/ecotox/ecossl/

U.S. Environmental Protection Agency (USEPA). 2006. Ecological Soil Screening Levels for Silver: http://www.epa.gov/ecotox/ecossl/

U.S. Environmental Protection Agency (USEPA). 2007. Ecological Soil Screening Levels for Cooper, Manganese, Nickel, Selenium, Zinc, PAHs (LMW & HMW) and Pentachlorophenol: http://www.epa.gov/ecotox/ecossl/

NSV - No Screening Value

1 - Stated criteria compared to mean site-specific soil pH

TABLE 2

Site 2 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Retain?	Rationale
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.47 - 0.57	0 / 5	--	--	300	-- / --	0.0019	No	Not detected
1,1,2,2-Tetrachloroethane	0.47 - 0.57	0 / 5	--	--	300	-- / --	0.0019	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.47 - 0.57	0 / 5	--	--	300	-- / --	0.0019	No	Not detected
1,1-Dichloroethane	0.24 - 0.29	0 / 5	--	--	300	-- / --	9.67E-04	No	Not detected
1,1-Dichloroethene	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2,3-Trichlorobenzene	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.47 - 0.57	0 / 5	--	--	100	-- / --	0.0057	No	Not detected
1,2-Dibromo-3-chloropropane	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.47 - 0.57	0 / 5	--	--	5,000	-- / --	1.14E-04	No	Not detected
1,2-Dichlorobenzene	0.47 - 0.57	0 / 5	--	--	100	-- / --	0.0057	No	Not detected
1,2-Dichloroethane	0.47 - 0.57	0 / 5	--	--	870,000	-- / --	6.55E-07	No	Not detected
1,2-Dichloropropane	0.47 - 0.57	0 / 5	--	--	300	-- / --	0.0019	No	Not detected
1,3-Dichlorobenzene	0.24 - 0.29	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,4-Dichlorobenzene	0.24 - 0.29	0 / 5	--	--	100	-- / --	0.0029	No	Not detected
2-Butanone	-- - --	5 / 5	16.0	CBD-S02-SS03-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
2-Hexanone	0.47 - 0.54	1 / 5	7.00	CBD-S02-SS03-1012	12,600	0 / 5	5.556E-04	No	HQ less than one
4-Methyl-2-pentanone	0.47 - 0.57	0 / 5	--	--	100,000	-- / --	5.70E-06	No	Not detected
Acetone	40.0 - 86.0	3 / 5	350	CBD-S02-SS03-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Benzene	0.47 - 0.57	0 / 5	--	--	100	-- / --	0.0057	No	Not detected
Bromochloromethane	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Bromodichloromethane	0.47 - 0.57	0 / 5	--	--	450,000	-- / --	1.27E-06	No	Not detected
Bromoform	0.24 - 0.29	0 / 5	--	--	1,147,000	-- / --	2.53E-07	No	Not detected
Bromomethane	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Carbon disulfide	0.24 - 0.68	0 / 5	--	--	94.1	-- / --	0.0072	No	Not detected
Carbon tetrachloride	0.24 - 0.29	0 / 5	--	--	300	-- / --	9.67E-04	No	Not detected
Chlorobenzene	0.24 - 0.29	0 / 5	--	--	100	-- / --	0.0029	No	Not detected
Chloroethane	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Chloroform	0.21 - 0.29	0 / 5	--	--	300	-- / --	9.67E-04	No	Not detected
Chloromethane	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.24 - 0.29	0 / 5	--	--	300	-- / --	9.67E-04	No	Not detected
cis-1,3-Dichloropropene	0.24 - 0.29	0 / 5	--	--	300	-- / --	9.67E-04	No	Not detected
Cyclohexane	0.47 - 0.57	0 / 5	--	--	100	-- / --	0.0057	No	Not detected
Dibromochloromethane	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Ethylbenzene	0.47 - 0.57	0 / 5	--	--	100	-- / --	0.0057	No	Not detected
Isopropylbenzene	0.24 - 0.29	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
m- and p-Xylene	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Methyl acetate	0.99 - 1.50	1 / 5	790	CBD-S02-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Methylcyclohexane	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Methylene chloride	0.47 - 9.00	0 / 5	--	--	300	-- / --	0.030	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.47 - 0.57	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
o-Xylene	0.24 - 0.29	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Styrene	0.24 - 0.27	1 / 5	1.70	CBD-S02-SS03-1012	100	0 / 5	0.017	No	HQ less than one
Tetrachloroethene	0.47 - 0.57	0 / 5	--	--	300	-- / --	0.0019	No	Not detected

TABLE 2

Site 2 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Retain?	Rationale
Toluene	0.40 - 2.80	3 / 5	5.10	CBD-S02-SS02-1012	100	0 / 5	0.051	No	HQ less than one
trans-1,2-Dichloroethene	0.24 - 0.29	0 / 5	--	--	300	-- / --	9.67E-04	No	Not detected
trans-1,3-Dichloropropene	0.47 - 0.57	0 / 5	--	--	300	-- / --	0.0019	No	Not detected
Trichloroethene	0.24 - 0.29	0 / 5	--	--	300	-- / --	9.67E-04	No	Not detected
Trichlorofluoromethane (Freon-11)	0.24 - 0.29	0 / 5	--	--	16,400	-- / --	1.77E-05	No	Not detected
Vinyl chloride	0.24 - 0.29	0 / 5	--	--	300	-- / --	9.67E-04	No	Not detected
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	18.0 - 19.0	0 / 5	--	--	600	-- / --	0.032	No	Not detected
1,2,4,5-Tetrachlorobenzene	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,2'-Oxybis(1-chloropropane)	3.60 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,3,4,6-Tetrachlorophenol	3.60 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,4,5-Trichlorophenol	18.0 - 19.0	0 / 5	--	--	100	-- / --	0.19	No	Not detected
2,4,6-Trichlorophenol	3.60 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
2,4-Dichlorophenol	3.60 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
2,4-Dimethylphenol	36.0 - 38.0	0 / 5	--	--	100	-- / --	0.38	No	Not detected
2,4-Dinitrophenol	180 - 190	0 / 5	--	--	100	-- / --	1.90	No	Not detected
2,4-Dinitrotoluene	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,6-Dinitrotoluene	3.60 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Chloronaphthalene	3.60 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Chlorophenol	3.60 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
2-Methylnaphthalene	1.80 - 1.90	0 / 5	--	--	3,240	-- / --	0.001	No	Not detected
2-Methylphenol	7.10 - 7.50	0 / 5	--	--	100	-- / --	0.075	No	Not detected
2-Nitroaniline	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Nitrophenol	3.60 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
3,3'-Dichlorobenzidine	360 - 380	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
3-Nitroaniline	36.0 - 38.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4,6-Dinitro-2-methylphenol	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Bromophenyl-phenylether	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloro-3-methylphenol	7.10 - 7.50	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloroaniline	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chlorophenyl-phenylether	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Methylphenol	3.60 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
4-Nitroaniline	36.0 - 38.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Nitrophenol	36.0 - 38.0	0 / 5	--	--	100	-- / --	0.38	No	Not detected
Acenaphthene	1.80 - 1.90	1 / 5	1.10	CBD-S02-SS05-1012	100	0 / 5	0.011	No	HQ less than one
Acenaphthylene	1.80 - 1.90	0 / 5	--	--	100	-- / --	0.019	No	Not detected
Acetophenone	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Anthracene	1.80 - 1.90	1 / 5	1.10	CBD-S02-SS05-1012	100	0 / 5	0.011	No	HQ less than one
Atrazine	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Benzaldehyde	18.0 - 19.0	2 / 5	25.0	CBD-S02-SS05-1012	NSV	-- / --	NSV	**Yes**	No screening value
Benzo(a)anthracene	1.80 - 1.90	2 / 5	6.60	CBD-S02-SS05-1012	100	0 / 5	0.066	No	HQ less than one
Benzo(a)pyrene	0.73 - 0.77	2 / 5	6.70	CBD-S02-SS05-1012	100	0 / 5	0.067	No	HQ less than one
Benzo(b)fluoranthene	3.60 - 3.80	2 / 5	9.60	CBD-S02-SS05-1012	100	0 / 5	0.096	No	HQ less than one
Benzo(g,h,i)perylene	1.80 - 1.90	2 / 5	2.90	CBD-S02-SS05-1012	100	0 / 5	0.029	No	HQ less than one
Benzo(k)fluoranthene	3.60 - 3.80	1 / 5	5.90	CBD-S02-SS05-1012	100	0 / 5	0.059	No	HQ less than one
bis(2-Chloroethoxy)methane	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 2

Site 2 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Retain?	Rationale
bis(2-Chloroethyl)ether	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Ethylhexyl)phthalate	5.70 - 8.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Butylbenzylphthalate	3.60 - 3.80	2 / 5	110	CBD-S02-SS05-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Caprolactam	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Carbazole	36.0 - 38.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Chrysene	1.80 - 1.90	2 / 5	7.00	CBD-S02-SS05-1012	100	0 / 5	0.070	No	HQ less than one
Dibenz(a,h)anthracene	0.72 - 1.50	0 / 5	--	--	100	-- / --	0.015	No	Not detected
Dibenzofuran	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Diethylphthalate	8.60 - 24.0	0 / 5	--	--	1,000	-- / --	0.024	No	Not detected
Dimethyl phthalate	3.70 - 3.80	2 / 5	2.60	CBD-S02-SS02-1012	2,000	0 / 5	0.0013	No	HQ less than one
Di-n-butylphthalate	17.0 - 110	0 / 5	--	--	200,000	-- / --	5.50E-04	No	Not detected
Di-n-octylphthalate	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Fluoranthene	1.90 - 1.90	4 / 5	9.90	CBD-S02-SS05-1012	100	0 / 5	0.099	No	HQ less than one
Fluorene	1.80 - 1.90	1 / 5	1.10	CBD-S02-SS05-1012	100	0 / 5	0.011	No	HQ less than one
Hexachlorobenzene	1.80 - 1.90	0 / 5	--	--	1,000,000	-- / --	1.90E-06	No	Not detected
Hexachlorobutadiene	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Hexachlorocyclopentadiene	3.60 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
Hexachloroethane	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Indeno(1,2,3-cd)pyrene	3.60 - 3.80	1 / 5	3.70	CBD-S02-SS05-1012	100	0 / 5	0.037	No	HQ less than one
Isophorone	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Naphthalene	1.80 - 1.90	0 / 5	--	--	100	-- / --	0.019	No	Not detected
n-Nitroso-di-n-propylamine	3.60 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
n-Nitrosodiphenylamine	1.80 - 1.90	0 / 5	--	--	200	-- / --	0.0095	No	Not detected
Nitrobenzene	1.80 - 1.90	0 / 5	--	--	400	-- / --	0.0048	No	Not detected
Pentachlorophenol	36.0 - 38.0	0 / 5	--	--	5.00	-- / --	7.60	No	Not detected
Phenanthrene	-- - --	5 / 5	5.50	CBD-S02-SS05-1012	100	0 / 5	0.055	No	HQ less than one
Phenol	3.60 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
Pyrene	3.60 - 3.80	2 / 5	11.0	CBD-S02-SS05-1012	100	0 / 5	0.11	No	HQ less than one
Low Molecular Weight PAHs	-- - --	-- / --	18.7	CBD-S02-SS05-1013	29,000	-- / --	0.001	No	HQ less than one
High Molecular Weight PAHs	-- - --	-- / --	53.4	CBD-S02-SS05-1014	1,100	-- / --	0.05	No	HQ less than one
Pesticide/Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1221	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1232	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1242	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1248	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1254	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1260	14.0 - 14.0	2 / 5	5.10	CBD-S02-SS05-1012	100	0 / 5	0.051	No	HQ less than one
Aroclor-1262	14.0 - 15.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Aroclor-1268	14.0 - 15.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Inorganics (MG/KG)									
Aluminum	-- - --	5 / 5	12,000	CBD-S02-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Antimony	-- - --	5 / 5	0.25	CBD-S02-SS03-1012	78.0	0 / 5	0.0032	No	HQ less than one
Arsenic	-- - --	5 / 5	5.10	CBD-S02-SS04-1012	18.0	0 / 5	0.28	No	HQ less than one
Barium	-- - --	5 / 5	30.0	CBD-S02-SS04-1012	330	0 / 5	0.091	No	HQ less than one
Beryllium	-- - --	5 / 5	0.36	CBD-S02-SS04-1012	40.0	0 / 5	0.0090	No	HQ less than one

TABLE 2

Site 2 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Retain?	Rationale
Cadmium	0.021 - 0.021	4 / 5	0.044	CBD-S02-SS02-1012	32.0	0 / 5	0.0014	No	HQ less than one
Calcium [2]	200 - 210	3 / 5	420	CBD-S02-SS01-1012	NSV	-- / --	NSV	No	Macronutrient
Chromium (hexavalent)	-- - --	1 / 1	2.25	CBD-S02-SS01-1012	0.40	1 / 1	5.63	**Yes**	HQ greater than one
Chromium	-- - --	5 / 5	15.0	CBD-S02-SS03-1012	0.0075	5 / 5	2,000	**Yes**	HQ greater than one
Cobalt	-- - --	5 / 5	2.90	CBD-S02-SS01-1012	13.0	0 / 5	0.22	No	HQ less than one
Copper	-- - --	5 / 5	5.50	CBD-S02-SS03-1012	70.0	0 / 5	0.079	No	HQ less than one
Cyanide	0.054 - 0.057	0 / 5	--	--	0.005	-- / --	1.14E+01	No	Not detected
Iron	-- - --	5 / 5	17,000	CBD-S02-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Lead	-- - --	5 / 5	8.90	CBD-S02-SS01-1012	120	0 / 5	0.074	No	HQ less than one
Magnesium [2]	-- - --	5 / 5	820	CBD-S02-SS01-1012	NSV	-- / --	NSV	No	Macronutrient
Manganese	-- - --	5 / 5	55.0	CBD-S02-SS03-1012	220	0 / 5	0.25	No	HQ less than one
Mercury	0.017 - 0.017	4 / 5	0.021	CBD-S02-SS02-1012	0.058	0 / 5	0.36	No	HQ less than one
Nickel	-- - --	5 / 5	8.20	CBD-S02-SS01-1012	38.0	0 / 5	0.22	No	HQ less than one
Potassium [2]	-- - --	5 / 5	660	CBD-S02-SS03-1012	NSV	-- / --	NSV	No	Macronutrient
Selenium	-- - --	5 / 5	0.42	CBD-S02-SS04-1012	0.52	0 / 5	0.81	No	HQ less than one
Silver	-- - --	5 / 5	0.054	CBD-S02-SS01-1012	560	0 / 5	9.64E-05	No	HQ less than one
Sodium [2]	11.0 - 120	0 / 5	--	--	NSV	-- / --	NSV	No	Macronutrient
Thallium	-- - --	5 / 5	0.16	CBD-S02-SS03-1012	0.0010	5 / 5	160	**Yes**	HQ greater than one
Vanadium	-- - --	5 / 5	29.0	CBD-S02-SS03-1012	0.50	5 / 5	58.0	**Yes**	HQ greater than one
Zinc	13.0 - 18.0	1 / 5	22.0	CBD-S02-SS03-1012	120	0 / 5	0.18	No	HQ less than one
Other Parameters (various units)									
pH (PH)	-- - --	5 / 5	6.80	CBD-S02-SS01-1012	NSV	-- / --	NSV	--	--
Total organic carbon (TOC) (MG/KG)	-- - --	5 / 5	4,200	CBD-S02-SS05-1012	NSV	-- / --	NSV	--	--

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

2 - Macronutrient - Not considered to be a COPC

COPC - Contaminant of Potential Concern

HQ - Hazard Quotient

MG/KG - Milligrams per kilogram

NSV - No Screening Value

UG/KG - Micrograms per kilogram

TABLE 3

Site 3 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach , Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.42 - 0.55	0 / 5	--	--	300	-- / --	0.0018	No	Not detected
1,1,2,2-Tetrachloroethane	0.42 - 0.55	0 / 5	--	--	300	-- / --	0.0018	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.42 - 0.55	0 / 5	--	--	300	-- / --	0.0018	No	Not detected
1,1-Dichloroethane	0.21 - 0.28	0 / 5	--	--	300	-- / --	0.0009	No	Not detected
1,1-Dichloroethene	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2,3-Trichlorobenzene	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.42 - 0.55	0 / 5	--	--	100	-- / --	0.006	No	Not detected
1,2-Dibromo-3-chloropropane	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.42 - 0.55	0 / 5	--	--	5,000	-- / --	0.00011	No	Not detected
1,2-Dichlorobenzene	0.42 - 0.55	0 / 5	--	--	100	-- / --	0.0055	No	Not detected
1,2-Dichloroethane	0.42 - 0.55	0 / 5	--	--	870,000	-- / --	0.0000006	No	Not detected
1,2-Dichloropropane	0.42 - 0.55	0 / 5	--	--	300	-- / --	0.0018	No	Not detected
1,3-Dichlorobenzene	0.21 - 0.28	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,4-Dichlorobenzene	0.21 - 0.28	0 / 5	--	--	100	-- / --	0.0028	No	Not detected
2-Butanone	0.55 - 1.70	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Hexanone	0.42 - 0.55	0 / 5	--	--	12,600	-- / --	4.37E-05	No	Not detected
4-Methyl-2-pentanone	0.42 - 0.50	1 / 5	3.00	CBD-S03-SS03-1012	100,000	0 / 5	0.00003	No	HQ less than one
Acetone	31.0 - 71.0	1 / 5	65.0	CBD-S03-SS05-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Benzene	0.42 - 0.55	0 / 5	--	--	100	-- / --	0.0055	No	Not detected
Bromochloromethane	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Bromodichloromethane	0.42 - 0.55	0 / 5	--	--	450,000	-- / --	0.000001	No	Not detected
Bromoform	0.21 - 0.28	0 / 5	--	--	1,147,000	-- / --	0.0000002	No	Not detected
Bromomethane	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Carbon disulfide	0.40 - 0.66	0 / 5	--	--	94.1	-- / --	0.007	No	Not detected
Carbon tetrachloride	0.21 - 0.28	0 / 5	--	--	300	-- / --	0.0009	No	Not detected
Chlorobenzene	0.21 - 0.28	0 / 5	--	--	100	-- / --	0.0028	No	Not detected
Chloroethane	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Chloroform	0.18 - 0.28	1 / 5	0.14	CBD-S03-SS05-1012	300	0 / 5	0.0005	No	HQ less than one
Chloromethane	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.21 - 0.28	0 / 5	--	--	300	-- / --	0.0009	No	Not detected
cis-1,3-Dichloropropene	0.21 - 0.28	0 / 5	--	--	300	-- / --	0.0009	No	Not detected
Cyclohexane	0.42 - 0.55	0 / 5	--	--	100	-- / --	0.0055	No	Not detected
Dibromochloromethane	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 3

Site 3 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach , Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Ethylbenzene	0.42 - 0.55	0 / 5	--	--	100	-- / --	0.0055	No	Not detected
Isopropylbenzene	0.21 - 0.28	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
m- and p-Xylene	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Methyl acetate	1.30 - 2.60	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Methylcyclohexane	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Methylene chloride	0.42 - 0.55	0 / 5	--	--	300	-- / --	0.0018	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.42 - 0.55	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
o-Xylene	0.21 - 0.28	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Styrene	0.21 - 0.28	0 / 5	--	--	100	-- / --	0.0028	No	Not detected
Tetrachloroethene	0.42 - 0.55	0 / 5	--	--	300	-- / --	0.0018	No	Not detected
Toluene	0.42 - 0.55	0 / 5	--	--	100	-- / --	0.0055	No	Not detected
trans-1,2-Dichloroethene	0.21 - 0.28	0 / 5	--	--	300	-- / --	0.0009	No	Not detected
trans-1,3-Dichloropropene	0.42 - 0.55	0 / 5	--	--	300	-- / --	0.0018	No	Not detected
Trichloroethene	0.21 - 0.28	0 / 5	--	--	300	-- / --	0.0009	No	Not detected
Trichlorofluoromethane (Freon-11)	0.21 - 0.25	1 / 5	0.28	CBD-S03-SS03-1012	16,400	0 / 5	0.00002	No	HQ less than one
Vinyl chloride	0.21 - 0.28	0 / 5	--	--	300	-- / --	0.0009	No	Not detected
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	18.0 - 18.0	0 / 5	--	--	600	-- / --	0.030	No	Not detected
1,2,4,5-Tetrachlorobenzene	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,2'-Oxybis(1-chloropropane)	3.60 - 3.70	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,3,4,6-Tetrachlorophenol	3.60 - 3.70	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,4,5-Trichlorophenol	18.0 - 18.0	0 / 5	--	--	100	-- / --	0.18	No	Not detected
2,4,6-Trichlorophenol	3.60 - 3.70	0 / 5	--	--	100	-- / --	0.037	No	Not detected
2,4-Dichlorophenol	3.60 - 3.60	0 / 5	--	--	100	-- / --	0.036	No	Not detected
2,4-Dimethylphenol	36.0 - 37.0	0 / 5	--	--	100	-- / --	0.37	No	Not detected
2,4-Dinitrophenol	180 - 180	0 / 5	--	--	100	-- / --	1.80	No	Not detected
2,4-Dinitrotoluene	18.0 - 18.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,6-Dinitrotoluene	3.60 - 3.70	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Chloronaphthalene	3.60 - 3.70	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Chlorophenol	3.60 - 3.70	0 / 5	--	--	100	-- / --	0.037	No	Not detected
2-Methylnaphthalene	1.80 - 1.80	0 / 5	--	--	3,240	-- / --	0.001	No	Not detected
2-Methylphenol	7.20 - 7.30	0 / 5	--	--	100	-- / --	0.073	No	Not detected
2-Nitroaniline	18.0 - 18.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Nitrophenol	3.60 - 3.70	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
3,3'-Dichlorobenzidine	360 - 370	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
3-Nitroaniline	36.0 - 37.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 3

Site 3 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach , Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
4,6-Dinitro-2-methylphenol	18.0 - 18.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Bromophenyl-phenylether	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloro-3-methylphenol	7.20 - 7.30	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloroaniline	18.0 - 18.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chlorophenyl-phenylether	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Methylphenol	3.60 - 3.70	0 / 5	--	--	100	-- / --	0.037	No	Not detected
4-Nitroaniline	36.0 - 37.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Nitrophenol	36.0 - 37.0	0 / 5	--	--	100	-- / --	0.37	No	Not detected
Acenaphthene	1.80 - 1.80	1 / 5	1.50	CBD-S03-SS04-1012	100	0 / 5	0.015	No	HQ less than one
Acenaphthylene	1.80 - 1.80	0 / 5	--	--	100	-- / --	0.018	No	Not detected
Acetophenone	18.0 - 18.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Anthracene	1.10 - 4.80	0 / 5	--	--	100	-- / --	0.048	No	Not detected
Atrazine	18.0 - 18.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Benzo(a)anthracene	1.80 - 41.0	0 / 5	--	--	100	-- / --	0.41	No	Not detected
Benzo(a)pyrene	2.90 - 7.40	2 / 5	48.0	CBD-S03-SS04-1012	100	0 / 5	0.48	No	HQ less than one
Benzo(b)fluoranthene	2.30 - 23.0	1 / 5	120	CBD-S03-SS04-1012	100	1 / 5	1.20	**Yes**	HQ greater than one
Benzo(g,h,i)perylene	1.80 - 8.20	1 / 5	42.0	CBD-S03-SS04-1012	100	0 / 5	0.42	No	HQ less than one
Benzo(k)fluoranthene	2.60 - 7.40	1 / 5	58.0	CBD-S03-SS04-1012	100	0 / 5	0.58	No	HQ less than one
bis(2-Chloroethoxy)methane	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Chloroethyl)ether	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Ethylhexyl)phthalate	8.50 - 46.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Butylbenzylphthalate	3.60 - 3.70	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Caprolactam	18.0 - 18.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Carbazole	36.0 - 37.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Chrysene	2.20 - 45.0	0 / 5	--	--	100	-- / --	0.45	No	Not detected
Dibenz(a,h)anthracene	2.90 - 7.40	2 / 5	7.40	CBD-S03-SS04-1012	100	0 / 5	0.074	No	HQ less than one
Dibenzofuran	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Diethylphthalate	5.90 - 10.0	0 / 5	--	--	1,000	-- / --	0.010	No	Not detected
Dimethyl phthalate	3.60 - 3.70	0 / 5	--	--	2,000	-- / --	0.0019	No	Not detected
Di-n-butylphthalate	18.0 - 18.0	0 / 5	--	--	200,000	-- / --	9.00E-05	No	Not detected
Di-n-octylphthalate	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Fluoranthene	1.80 - 11.0	1 / 5	39.0	CBD-S03-SS04-1012	100	0 / 5	0.39	No	HQ less than one
Fluorene	1.80 - 1.80	1 / 5	1.10	CBD-S03-SS04-1012	100	0 / 5	0.011	No	HQ less than one
Hexachlorobenzene	1.80 - 1.80	0 / 5	--	--	1,000,000	-- / --	1.80E-06	No	Not detected
Hexachlorobutadiene	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Hexachlorocyclopentadiene	3.60 - 3.70	0 / 5	--	--	100	-- / --	0.037	No	Not detected

TABLE 3

Site 3 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach , Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Hexachloroethane	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Indeno(1,2,3-cd)pyrene	3.60 - 7.10	1 / 5	37.0	CBD-S03-SS04-1012	100	0 / 5	0.37	No	HQ less than one
Isophorone	1.80 - 1.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Naphthalene	1.80 - 1.80	0 / 5	--	--	100	-- / --	0.018	No	Not detected
n-Nitroso-di-n-propylamine	3.60 - 3.70	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
n-Nitrosodiphenylamine	1.80 - 1.80	0 / 5	--	--	200	-- / --	0.0090	No	Not detected
Nitrobenzene	1.80 - 1.80	0 / 5	--	--	400	-- / --	0.0045	No	Not detected
Pentachlorophenol	36.0 - 37.0	0 / 5	--	--	5.00	-- / --	7.40	No	Not detected
Phenanthrene	1.10 - 5.90	1 / 5	21.0	CBD-S03-SS04-1012	100	0 / 5	0.21	No	HQ less than one
Phenol	3.60 - 3.60	0 / 5	--	--	100	-- / --	0.036	No	Not detected
Pyrene	1.50 - 13.0	1 / 5	68.0	CBD-S03-SS04-1012	100	0 / 5	0.68	No	HQ less than one
Low Molecular Weight PAHs	-- - --	-- / --	62.6	CBD-S03-SS04-1013	29,000	-- / --	0.002	No	HQ less than one
High Molecular Weight PAHs	-- - --	-- / --	380.4	CBD-S03-SS04-1014	1,100	-- / --	0.35	No	HQ less than one
Pesticide/Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	14.0 - 290	0 / 5	--	--	100	-- / --	2.90	No	Not detected
Aroclor-1221	14.0 - 290	0 / 5	--	--	100	-- / --	2.90	No	Not detected
Aroclor-1232	14.0 - 290	0 / 5	--	--	100	-- / --	2.90	No	Not detected
Aroclor-1242	14.0 - 290	0 / 5	--	--	100	-- / --	2.90	No	Not detected
Aroclor-1248	14.0 - 290	0 / 5	--	--	100	-- / --	2.90	No	Not detected
Aroclor-1254	14.0 - 290	0 / 5	--	--	100	-- / --	2.90	No	Not detected
Aroclor-1260	-- - --	5 / 5	5,500	CBD-S03-SS03-1012	100	4 / 5	55.0	**Yes**	HQ greater than one
Aroclor-1262	14.0 - 290	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Aroclor-1268	14.0 - 290	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Inorganics (MG/KG)									
Aluminum	-- - --	5 / 5	7,900	CBD-S03-SS05-1012	NSV	-- / --	NSV	**Yes**	No screening value
Antimony	-- - --	5 / 5	0.90	CBD-S03-SS03-1012	78.0	0 / 5	0.012	No	HQ less than one
Arsenic	-- - --	5 / 5	14.0	CBD-S03-SS03-1012	18.0	0 / 5	0.78	No	HQ less than one
Barium	-- - --	5 / 5	44.0	CBD-S03-SS05-1012	330	0 / 5	0.13	No	HQ less than one
Beryllium	-- - --	5 / 5	0.64	CBD-S03-SS05-1012	40.0	0 / 5	0.016	No	HQ less than one
Cadmium	-- - --	5 / 5	0.17	CBD-S03-SS05-1012	32.0	0 / 5	0.0053	No	HQ less than one
Calcium [2]	-- - --	5 / 5	4,100	CBD-S03-SS01-1012	NSV	-- / --	NSV	No	Macronutrient
Chromium (hexavalent)	-- - --	1 / 1	0.15	CBD-S03-SS01-1012	0.40	0 / 1	0.375	No	HQ less than one
Chromium	-- - --	5 / 5	12.0	CBD-S03-SS03-1012	0.0075	5 / 5	1,600	**Yes**	HQ greater than one
Cobalt	-- - --	5 / 5	3.40	CBD-S03-SS05-1012	13.0	0 / 5	0.26	No	HQ less than one
Copper	-- - --	5 / 5	3.90	CBD-S03-SS03-1012	70.0	0 / 5	0.056	No	HQ less than one
Cyanide	0.054 - 0.055	1 / 5	0.043	CBD-S03-SS05-1012	0.005	1 / 5	8.6	**Yes**	HQ greater than one

TABLE 3

Site 3 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach , Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Iron	-- - --	5 / 5	8,400	CBD-S03-SS04-1012	NSV	-- / --	NSV	**Yes**	No screening value
Lead	-- - --	5 / 5	11.0	CBD-S03-SS04-1012	120	0 / 5	0.092	No	HQ less than one
Magnesium [2]	-- - --	5 / 5	1,400	CBD-S03-SS01-1012	NSV	-- / --	NSV	No	Macronutrient
Manganese	-- - --	5 / 5	160	CBD-S03-SS01-1012	220	0 / 5	0.73	No	HQ less than one
Mercury	0.017 - 0.017	4 / 5	0.012	CBD-S03-SS01-1012	0.058	0 / 5	0.21	No	HQ less than one
Nickel	-- - --	5 / 5	10.0	CBD-S03-SS01-1012	38.0	0 / 5	0.26	No	HQ less than one
Potassium [2]	-- - --	5 / 5	400	CBD-S03-SS02-1012	NSV	-- / --	NSV	No	Macronutrient
Selenium	0.18 - 0.18	4 / 5	0.96	CBD-S03-SS03-1012	0.52	1 / 5	1.85	**Yes**	HQ greater than one
Silver	-- - --	5 / 5	0.034	CBD-S03-SS04-1012	560	0 / 5	6.07E-05	No	HQ less than one
Sodium [2]	15.0 - 26.0	1 / 5	200	CBD-S03-SS01-1012	NSV	-- / --	NSV	No	Macronutrient
Thallium	-- - --	5 / 5	0.24	CBD-S03-SS05-1012	0.0010	5 / 5	240	**Yes**	HQ greater than one
Vanadium	-- - --	5 / 5	18.0	CBD-S03-SS03-1012	0.50	5 / 5	36.0	**Yes**	HQ greater than one
Zinc	8.60 - 20.0	3 / 5	45.0	CBD-S03-SS05-1012	120	0 / 5	0.38	No	HQ less than one
Other Parameters (various units)									
pH (PH)	-- - --	5 / 5	6.60	CBD-S03-SS03-1012	NSV	-- / --	NSV	--	--
Total organic carbon (TOC) (MG/KG)	1,100 - 1,100	4 / 5	11,000	CBD-S03-SS05-1012	NSV	-- / --	NSV	--	--

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

2 - Macronutrient - Not considered to be a COPC

COPC - Contaminant of Potential Concern

HQ - Hazard Quotient

MG/KG - Milligrams per kilogram

NSV - No Screening Value

UG/KG - Micrograms per kilogram

TABLE 4

Site 4 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.42 - 0.57	0 / 6	--	--	300	-- / --	0.0019	No	Not detected
1,1,2,2-Tetrachloroethane	0.42 - 0.57	0 / 6	--	--	300	-- / --	0.0019	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.42 - 0.57	0 / 6	--	--	300	-- / --	0.0019	No	Not detected
1,1-Dichloroethane	0.21 - 0.29	0 / 6	--	--	300	-- / --	9.67E-04	No	Not detected
1,1-Dichloroethene	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,2,3-Trichlorobenzene	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.42 - 0.57	0 / 6	--	--	100	-- / --	0.0057	No	Not detected
1,2-Dibromo-3-chloropropane	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.42 - 0.57	0 / 6	--	--	5,000	-- / --	1.14E-04	No	Not detected
1,2-Dichlorobenzene	0.42 - 0.57	0 / 6	--	--	100	-- / --	0.0057	No	Not detected
1,2-Dichloroethane	0.42 - 0.57	0 / 6	--	--	870,000	-- / --	6.55E-07	No	Not detected
1,2-Dichloropropane	0.42 - 0.57	0 / 6	--	--	300	-- / --	0.0019	No	Not detected
1,3-Dichlorobenzene	0.21 - 0.29	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,4-Dichlorobenzene	0.21 - 0.29	0 / 6	--	--	100	-- / --	0.0029	No	Not detected
2-Butanone	0.42 - 3.80	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2-Hexanone	0.42 - 0.57	0 / 6	--	--	12,600	-- / --	4.52E-05	No	Not detected
4-Methyl-2-pentanone	0.42 - 0.57	0 / 6	--	--	100,000	-- / --	5.70E-06	No	Not detected
Acetone	-- - --	6 / 6	100	CBD-S04-SS03-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Benzene	0.42 - 0.57	1 / 6	0.18	CBD-S04-SS03-1012	100	0 / 6	0.0018	No	HQ less than one
Bromochloromethane	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Bromodichloromethane	0.42 - 0.57	0 / 6	--	--	450,000	-- / --	1.27E-06	No	Not detected
Bromoform	0.21 - 0.29	0 / 6	--	--	1,147,000	-- / --	2.53E-07	No	Not detected
Bromomethane	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Carbon disulfide	0.33 - 0.63	0 / 6	--	--	94.1	-- / --	0.0067	No	Not detected
Carbon tetrachloride	0.21 - 0.29	0 / 6	--	--	300	-- / --	9.67E-04	No	Not detected
Chlorobenzene	0.21 - 0.29	0 / 6	--	--	100	-- / --	0.0029	No	Not detected
Chloroethane	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Chloroform	0.17 - 0.26	0 / 6	--	--	300	-- / --	8.67E-04	No	Not detected
Chloromethane	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.21 - 0.29	0 / 6	--	--	300	-- / --	9.67E-04	No	Not detected
cis-1,3-Dichloropropene	0.21 - 0.29	0 / 6	--	--	300	-- / --	9.67E-04	No	Not detected
Cyclohexane	0.42 - 0.57	0 / 6	--	--	100	-- / --	0.0057	No	Not detected
Dibromochloromethane	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Ethylbenzene	0.42 - 0.57	0 / 6	--	--	100	-- / --	0.0057	No	Not detected
Isopropylbenzene	0.21 - 0.29	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
m- and p-Xylene	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Methyl acetate	1.30 - 6.30	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Methylcyclohexane	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Methylene chloride	0.42 - 0.57	0 / 6	--	--	300	-- / --	0.0019	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.42 - 0.57	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 4

Site 4 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
o-Xylene	0.21 - 0.29	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Styrene	0.21 - 0.29	0 / 6	--	--	100	-- / --	0.0029	No	Not detected
Tetrachloroethene	0.42 - 0.57	0 / 6	--	--	300	-- / --	0.0019	No	Not detected
Toluene	0.42 - 0.57	1 / 6	0.20	CBD-S04-SS03-1012	100	0 / 6	0.0020	No	HQ less than one
trans-1,2-Dichloroethene	0.21 - 0.29	0 / 6	--	--	300	-- / --	9.67E-04	No	Not detected
trans-1,3-Dichloropropene	0.42 - 0.57	0 / 6	--	--	300	-- / --	0.0019	No	Not detected
Trichloroethene	0.21 - 0.29	0 / 6	--	--	300	-- / --	9.67E-04	No	Not detected
Trichlorofluoromethane (Freon-11)	0.21 - 0.29	1 / 6	0.26	CBD-S04-SS01-1012	16,400	0 / 6	0.00002	No	HQ less than one
Vinyl chloride	0.21 - 0.29	0 / 6	--	--	300	-- / --	9.67E-04	No	Not detected
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	18.0 - 19.0	1 / 6	13.0	CBD-S04-SS03-1012	600	0 / 6	0.022	No	HQ less than one
1,2,4,5-Tetrachlorobenzene	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2,2'-Oxybis(1-chloropropane)	3.50 - 3.80	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2,3,4,6-Tetrachlorophenol	3.50 - 3.80	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2,4,5-Trichlorophenol	18.0 - 19.0	0 / 6	--	--	100	-- / --	0.19	No	Not detected
2,4,6-Trichlorophenol	3.50 - 3.80	0 / 6	--	--	100	-- / --	0.038	No	Not detected
2,4-Dichlorophenol	3.50 - 3.80	0 / 6	--	--	100	-- / --	0.038	No	Not detected
2,4-Dimethylphenol	35.0 - 38.0	0 / 6	--	--	100	-- / --	0.38	No	Not detected
2,4-Dinitrophenol	180 - 190	0 / 6	--	--	100	-- / --	1.90	No	Not detected
2,4-Dinitrotoluene	18.0 - 19.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2,6-Dinitrotoluene	3.50 - 3.80	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2-Chloronaphthalene	3.50 - 3.80	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2-Chlorophenol	3.50 - 3.80	0 / 6	--	--	100	-- / --	0.038	No	Not detected
2-Methylnaphthalene	1.80 - 1.90	1 / 6	32.0	CBD-S04-SS03-1012	3,240	0 / 6	0.01	No	HQ less than one
2-Methylphenol	7.00 - 7.60	0 / 6	--	--	100	-- / --	0.076	No	Not detected
2-Nitroaniline	18.0 - 19.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2-Nitrophenol	3.50 - 3.80	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
3,3'-Dichlorobenzidine	350 - 380	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
3-Nitroaniline	35.0 - 38.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4,6-Dinitro-2-methylphenol	18.0 - 19.0	1 / 6	23.0	CBD-S04-SS02-1012	NSV	-- / --	NSV	**Yes**	No screening value
4-Bromophenyl-phenylether	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloro-3-methylphenol	7.00 - 7.60	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloroaniline	18.0 - 19.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Chlorophenyl-phenylether	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Methylphenol	3.50 - 3.80	0 / 6	--	--	100	-- / --	0.038	No	Not detected
4-Nitroaniline	35.0 - 38.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Nitrophenol	35.0 - 38.0	0 / 6	--	--	100	-- / --	0.38	No	Not detected
Acenaphthene	1.90 - 1.90	3 / 6	310	CBD-S04-SS03-1012	100	1 / 6	3.10	**Yes**	HQ greater than one
Acenaphthylene	1.80 - 1.90	1 / 6	3.40	CBD-S04-SS03-1012	100	0 / 6	0.034	No	HQ less than one
Acetophenone	18.0 - 19.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Anthracene	1.90 - 1.90	3 / 6	580	CBD-S04-SS03-1012	100	1 / 6	5.80	**Yes**	HQ greater than one
Atrazine	18.0 - 19.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Benzaldehyde					NSV	-- --	NSV	No	Not detected

TABLE 4

Site 4 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Benzo(a)anthracene	1.90 - 1.90	4 / 6	3,100	CBD-S04-SS03-1012	100	1 / 6	31.0	**Yes**	HQ greater than one
Benzo(a)pyrene	0.77 - 3.80	3 / 6	3,500	CBD-S04-SS03-1012	100	1 / 6	35.0	**Yes**	HQ greater than one
Benzo(b)fluoranthene	3.80 - 3.80	3 / 6	3,900	CBD-S04-SS03-1012	100	2 / 6	39.0	**Yes**	HQ greater than one
Benzo(g,h,i)perylene	1.90 - 1.90	4 / 6	800	CBD-S04-SS03-1012	100	1 / 6	8.00	**Yes**	HQ greater than one
Benzo(k)fluoranthene	3.80 - 3.80	3 / 6	730	CBD-S04-SS03-1012	100	1 / 6	7.30	**Yes**	HQ greater than one
bis(2-Chloroethoxy)methane	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Chloroethyl)ether	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Ethylhexyl)phthalate	5.00 - 16.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Butylbenzylphthalate	3.50 - 3.80	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Caprolactam	18.0 - 19.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Carbazole	35.0 - 38.0	1 / 6	380	CBD-S04-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Chrysene	1.90 - 1.90	4 / 6	2,600	CBD-S04-SS03-1012	100	1 / 6	26.0	**Yes**	HQ greater than one
Dibenz(a,h)anthracene	0.77 - 3.80	3 / 6	230	CBD-S04-SS03-1012	100	1 / 6	2.30	**Yes**	HQ greater than one
Dibenzofuran	1.90 - 1.90	3 / 6	170	CBD-S04-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Diethylphthalate	3.10 - 8.70	0 / 6	--	--	1,000	-- / --	0.0087	No	Not detected
Dimethyl phthalate	3.50 - 3.80	1 / 6	2.30	CBD-S04-SS02-1012	2,000	0 / 6	0.0012	No	HQ less than one
Di-n-butylphthalate	18.0 - 19.0	0 / 6	--	--	200,000	-- / --	9.50E-05	No	Not detected
Di-n-octylphthalate	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Fluoranthene	1.90 - 1.90	5 / 6	4,800	CBD-S04-SS03-1012	100	2 / 6	48.0	**Yes**	HQ greater than one
Fluorene	1.90 - 1.90	3 / 6	210	CBD-S04-SS03-1012	100	1 / 6	2.10	**Yes**	HQ greater than one
Hexachlorobenzene	1.80 - 1.90	0 / 6	--	--	1,000,000	-- / --	1.90E-06	No	Not detected
Hexachlorobutadiene	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Hexachlorocyclopentadiene	3.50 - 3.80	0 / 6	--	--	100	-- / --	0.038	No	Not detected
Hexachloroethane	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Indeno(1,2,3-cd)pyrene	3.80 - 3.80	3 / 6	830	CBD-S04-SS03-1012	100	1 / 6	8.30	**Yes**	HQ greater than one
Isophorone	1.80 - 1.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Naphthalene	1.90 - 1.90	3 / 6	84.0	CBD-S04-SS03-1012	100	0 / 6	0.84	No	HQ less than one
n-Nitroso-di-n-propylamine	3.50 - 3.80	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
n-Nitrosodiphenylamine	1.80 - 1.90	0 / 6	--	--	200	-- / --	0.0095	No	Not detected
Nitrobenzene	1.80 - 1.90	0 / 6	--	--	400	-- / --	0.0048	No	Not detected
Pentachlorophenol	35.0 - 38.0	0 / 6	--	--	5.00	-- / --	7.60	No	Not detected
Phenanthrene	1.90 - 1.90	5 / 6	3,500	CBD-S04-SS03-1012	100	1 / 6	35.0	**Yes**	HQ greater than one
Phenol	3.50 - 3.80	0 / 6	--	--	100	-- / --	0.038	No	Not detected
Pyrene	3.70 - 3.70	4 / 6	4,500	CBD-S04-SS03-1012	100	2 / 6	45.0	**Yes**	HQ greater than one
Low Molecular Weight PAHs	-- - --	-- / --	9,519	CBD-S04-SS03-1012	29,000	-- / --	0.3	No	HQ less than one
High Molecular Weight PAHs	-- - --	-- / --	20,190	CBD-S04-SS03-1012	1,100	-- / --	18.4	**Yes**	HQ greater than one
Pesticide/Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	14.0 - 15.0	0 / 6	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1221	14.0 - 15.0	0 / 6	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1232	14.0 - 15.0	0 / 6	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1242	14.0 - 15.0	0 / 6	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1248	14.0 - 15.0	0 / 6	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1254	14.0 - 15.0	0 / 6	--	--	100	-- / --	0.15	No	Not detected

TABLE 4

Site 4 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Aroclor-1260	15.0 - 15.0	4 / 6	260	CBD-S04-SS03-1012	100	1 / 6	2.60	**Yes**	HQ greater than one
Aroclor-1262	14.0 - 15.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Aroclor-1268	14.0 - 15.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Inorganics (MG/KG)									
Aluminum	-- - --	6 / 6	15,000	CBD-S04-SS05-1012	NSV	-- / --	NSV	**Yes**	No screening value
Antimony	-- - --	6 / 6	2.10	CBD-S04-SS04-1012	78.0	0 / 6	0.027	No	HQ less than one
Arsenic	-- - --	6 / 6	5.20	CBD-S04-SS01-1012	18.0	0 / 6	0.29	No	HQ less than one
Barium	-- - --	6 / 6	43.0	CBD-S04-SS05-1012	330	0 / 6	0.13	No	HQ less than one
Beryllium	-- - --	6 / 6	0.58	CBD-S04-SS05-1012	40.0	0 / 6	0.015	No	HQ less than one
Cadmium	-- - --	6 / 6	0.29	CBD-S04-SS06-1012	32.0	0 / 6	0.0091	No	HQ less than one
Calcium [2]	-- - --	6 / 6	750	CBD-S04-SS06-1012	NSV	-- / --	NSV	No	Macronutrient
Chromium (hexavalent)	-- - --	1 / 1	0.35	CBD-S04-SS01-1012	0.40	0 / 1	0.88	No	HQ less than one
Chromium	-- - --	6 / 6	20.0	CBD-S04-SS05-1012	0.0075	6 / 6	2,667	**Yes**	HQ greater than one
Cobalt	-- - --	6 / 6	4.00	CBD-S04-SS05-1012	13.0	0 / 6	0.31	No	HQ less than one
Copper	-- - --	6 / 6	14.0	CBD-S04-SS06-1012	70.0	0 / 6	0.20	No	HQ less than one
Cyanide	0.055 - 0.057	1 / 6	0.026	CBD-S04-SS06-1012	0.005	1 / 6	5.20	**Yes**	HQ greater than one
Iron	-- - --	6 / 6	21,000	CBD-S04-SS05-1012	NSV	-- / --	NSV	**Yes**	No screening value
Lead	-- - --	6 / 6	59.0	CBD-S04-SS04-1012	120	0 / 6	0.49	No	HQ less than one
Magnesium [2]	-- - --	6 / 6	1,400	CBD-S04-SS05-1012	NSV	-- / --	NSV	No	Macronutrient
Manganese	-- - --	6 / 6	120	CBD-S04-SS05-1012	220	0 / 6	0.55	No	HQ less than one
Mercury	0.017 - 0.017	5 / 6	0.084	CBD-S04-SS04-1012	0.058	2 / 6	1.45	**Yes**	HQ greater than one
Nickel	-- - --	6 / 6	7.70	CBD-S04-SS05-1012	38.0	0 / 6	0.20	No	HQ less than one
Potassium [3]	-- - --	6 / 6	930	CBD-S04-SS01-1012	NSV	-- / --	NSV	No	Macronutrient
Selenium	-- - --	6 / 6	0.41	CBD-S04-SS01-1012	0.52	0 / 6	0.79	No	HQ less than one
Silver	-- - --	6 / 6	0.94	CBD-S04-SS04-1012	560	0 / 6	0.0017	No	HQ less than one
Sodium [2]	9.60 - 23.0	0 / 6	--	--	NSV	-- / --	NSV	No	Macronutrient
Thallium	-- - --	6 / 6	0.27	CBD-S04-SS05-1012	0.0010	6 / 6	270	**Yes**	HQ greater than one
Vanadium	-- - --	6 / 6	31.0	CBD-S04-SS05-1012	0.50	6 / 6	62.0	**Yes**	HQ greater than one
Zinc	19.0 - 96.0	2 / 6	66.0	CBD-S04-SS04-1012	120	0 / 6	0.55	No	HQ less than one
Other Parameters (various units)									
pH (PH)	-- - --	6 / 6	6.20	CBD-S04-SS06-1012	NSV	-- / --	NSV	--	--
Total organic carbon (TOC) (MG/KG)	-- - --	6 / 6	11,000	CBD-S04-SS06-1012	NSV	-- / --	NSV	--	--

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

2 - Macronutrient - Not considered to be a COPC

COPC - Contaminant of Potential Concern

HQ - Hazard Quotient

MG/KG - Milligrams per kilogram

NSV - No Screening Value

UG/KG - Micrograms per kilogram

TABLE 5

Site 5 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.47 - 0.67	0 / 6	--	--	300	-- / --	0.0022	No	Not detected
1,1,2,2-Tetrachloroethane	0.47 - 0.67	0 / 6	--	--	300	-- / --	0.0022	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.47 - 0.67	0 / 6	--	--	300	-- / --	0.0022	No	Not detected
1,1-Dichloroethane	0.23 - 0.33	0 / 6	--	--	300	-- / --	0.0011	No	Not detected
1,1-Dichloroethene	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,2,3-Trichlorobenzene	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.47 - 0.67	0 / 6	--	--	100	-- / --	0.0067	No	Not detected
1,2-Dibromo-3-chloropropane	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.47 - 0.67	0 / 6	--	--	5,000	-- / --	1.34E-04	No	Not detected
1,2-Dichlorobenzene	0.47 - 0.67	0 / 6	--	--	100	-- / --	0.0067	No	Not detected
1,2-Dichloroethane	0.47 - 0.67	0 / 6	--	--	870,000	-- / --	7.70E-07	No	Not detected
1,2-Dichloropropane	0.47 - 0.67	0 / 6	--	--	300	-- / --	0.0022	No	Not detected
1,3-Dichlorobenzene	0.23 - 0.33	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
1,4-Dichlorobenzene	0.23 - 0.33	0 / 6	--	--	100	-- / --	0.0033	No	Not detected
2-Butanone	0.44 - 9.90	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2-Hexanone	0.47 - 0.67	0 / 6	--	--	12,600	-- / --	5.32E-05	No	Not detected
4-Methyl-2-pentanone	0.47 - 0.67	0 / 6	--	--	100,000	-- / --	6.70E-06	No	Not detected
Acetone	-- - --	6 / 6	400	CBD-S05-SS02-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Benzene	0.47 - 0.67	1 / 6	0.32	CBD-S05-SS06-1012	100	0 / 6	0.0032	No	HQ less than one
Bromochloromethane	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Bromodichloromethane	0.47 - 0.67	0 / 6	--	--	450,000	-- / --	1.49E-06	No	Not detected
Bromoform	0.23 - 0.33	0 / 6	--	--	1,147,000	-- / --	2.88E-07	No	Not detected
Bromomethane	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Carbon disulfide	0.38 - 0.70	0 / 6	--	--	94.1	-- / --	0.0074	No	Not detected
Carbon tetrachloride	0.23 - 0.33	0 / 6	--	--	300	-- / --	0.0011	No	Not detected
Chlorobenzene	0.23 - 0.33	0 / 6	--	--	100	-- / --	0.0033	No	Not detected
Chloroethane	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Chloroform	0.14 - 0.32	0 / 6	--	--	300	-- / --	0.0011	No	Not detected
Chloromethane	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.23 - 0.33	0 / 6	--	--	300	-- / --	0.0011	No	Not detected
cis-1,3-Dichloropropene	0.23 - 0.33	0 / 6	--	--	300	-- / --	0.0011	No	Not detected
Cyclohexane	0.47 - 0.67	0 / 6	--	--	100	-- / --	0.0067	No	Not detected
Dibromochloromethane	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Ethylbenzene	0.47 - 0.67	0 / 6	--	--	100	-- / --	0.0067	No	Not detected
Isopropylbenzene	0.23 - 0.33	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
m- and p-Xylene	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Methyl acetate	1.70 - 2.90	1 / 5	31.0	CBD-S05-SS05-1012	NSV	-- / --	NSV	**Yes**	No screening value
Methylcyclohexane	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Methylene chloride	0.47 - 1.40	0 / 6	--	--	300	-- / --	0.0047	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.47 - 0.67	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
o-Xylene	0.23 - 0.33	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Styrene	0.23 - 0.33	0 / 6	--	--	100	-- / --	0.0033	No	Not detected
Tetrachloroethene	0.47 - 0.67	0 / 6	--	--	300	-- / --	0.0022	No	Not detected
Toluene	-- - --	6 / 6	1.80	CBD-S05-SS05-1012	100	0 / 6	0.018	No	HQ less than one

TABLE 5

Site 5 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
trans-1,2-Dichloroethene	0.23 - 0.33	0 / 6	--	--	300	-- / --	0.0011	No	Not detected
trans-1,3-Dichloropropene	0.47 - 0.67	0 / 6	--	--	300	-- / --	0.0022	No	Not detected
Trichloroethene	0.23 - 0.33	0 / 6	--	--	300	-- / --	0.0011	No	Not detected
Trichlorofluoromethane (Freon-11)	0.23 - 0.33	1 / 6	0.26	CBD-S05-SS02-1012	16,400	0 / 6	0.00002	No	HQ less than one
Vinyl chloride	0.23 - 0.33	0 / 6	--	--	300	-- / --	0.0011	No	Not detected
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	18.0 - 1,000	0 / 6	--	--	600	-- / --	1.67	No	Not detected
1,2,4,5-Tetrachlorobenzene	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2,2'-Oxybis(1-chloropropane)	3.50 - 200	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2,3,4,6-Tetrachlorophenol	3.50 - 200	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2,4,5-Trichlorophenol	18.0 - 1,000	0 / 6	--	--	100	-- / --	10.0	No	Not detected
2,4,6-Trichlorophenol	3.50 - 200	0 / 6	--	--	100	-- / --	2.00	No	Not detected
2,4-Dichlorophenol	3.50 - 200	0 / 6	--	--	100	-- / --	2.00	No	Not detected
2,4-Dimethylphenol	35.0 - 2,000	0 / 6	--	--	100	-- / --	20.0	No	Not detected
2,4-Dinitrophenol	180 - 10,000	0 / 6	--	--	100	-- / --	100	No	Not detected
2,4-Dinitrotoluene	18.0 - 1,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2,6-Dinitrotoluene	3.50 - 200	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2-Chloronaphthalene	3.50 - 200	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2-Chlorophenol	3.50 - 200	0 / 6	--	--	100	-- / --	2.00	No	Not detected
2-Methylnaphthalene	1.80 - 2.50	2 / 6	330	CBD-S05-SS03-1012	3,240	0 / 6	0.10	No	HQ less than one
2-Methylphenol	6.90 - 400	0 / 6	--	--	100	-- / --	4.00	No	Not detected
2-Nitroaniline	18.0 - 1,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
2-Nitrophenol	3.50 - 200	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
3,3'-Dichlorobenzidine	350 - 20,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
3-Nitroaniline	35.0 - 2,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4,6-Dinitro-2-methylphenol	18.0 - 1,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Bromophenyl-phenylether	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloro-3-methylphenol	6.90 - 400	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloroaniline	18.0 - 1,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Chlorophenyl-phenylether	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Methylphenol	3.50 - 200	0 / 6	--	--	100	-- / --	2.00	No	Not detected
4-Nitroaniline	35.0 - 2,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
4-Nitrophenol	35.0 - 2,000	0 / 6	--	--	100	-- / --	20.0	No	Not detected
Acenaphthene	1.80 - 2.50	3 / 6	2,600	CBD-S05-SS03-1012	100	1 / 6	26.0	**Yes**	HQ greater than one
Acenaphthylene	1.80 - 100	1 / 6	1.30	CBD-S05-SS06-1012	100	0 / 6	0.013	No	HQ less than one
Acetophenone	18.0 - 1,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Anthracene	1.80 - 2.50	2 / 6	6,400	CBD-S05-SS03-1012	100	2 / 6	64.0	**Yes**	HQ greater than one
Atrazine	18.0 - 1,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Benzaldehyde					NSV	-- --	NSV	No	Not detected
Benzo(a)anthracene	1.80 - 1.80	5 / 6	30,000	CBD-S05-SS03-1012	100	2 / 6	300	**Yes**	HQ greater than one
Benzo(a)pyrene	3.50 - 3.50	5 / 6	3,700	CBD-S05-SS03-1012	100	3 / 6	37.0	**Yes**	HQ greater than one
Benzo(b)fluoranthene	3.50 - 3.50	5 / 6	32,000	CBD-S05-SS03-1012	100	2 / 6	320	**Yes**	HQ greater than one
Benzo(g,h,i)perylene	1.80 - 1.80	5 / 6	13,000	CBD-S05-SS03-1012	100	2 / 6	130	**Yes**	HQ greater than one
Benzo(k)fluoranthene	3.50 - 3.50	5 / 6	11,000	CBD-S05-SS03-1012	100	2 / 6	110	**Yes**	HQ greater than one
bis(2-Chloroethoxy)methane	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Chloroethyl)ether	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Ethylhexyl)phthalate	6.60 - 1,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 5

Site 5 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Butylbenzylphthalate	3.50 - 200	1 / 6	61.0	CBD-S05-SS01-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Caprolactam	18.0 - 1,000	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Carbazole	35.0 - 49.0	2 / 6	3,100	CBD-S05-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Chrysene	1.80 - 1.80	5 / 6	26,000	CBD-S05-SS03-1012	100	2 / 6	260	**Yes**	HQ greater than one
Dibenz(a,h)anthracene	3.50 - 3.60	3 / 6	420	CBD-S05-SS03-1012	100	1 / 6	4.20	**Yes**	HQ greater than one
Dibenzofuran	1.80 - 2.50	2 / 6	1,200	CBD-S05-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Diethylphthalate	3.50 - 200	0 / 6	--	--	1,000	-- / --	0.20	No	Not detected
Dimethyl phthalate	3.50 - 200	1 / 6	2.60	CBD-S05-SS04-1012	2,000	0 / 6	0.0013	No	HQ less than one
Di-n-butylphthalate	18.0 - 1,000	0 / 6	--	--	200,000	-- / --	0.0050	No	Not detected
Di-n-octylphthalate	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Fluoranthene	-- - --	6 / 6	45,000	CBD-S05-SS03-1012	100	2 / 6	450	**Yes**	HQ greater than one
Fluorene	1.80 - 2.50	2 / 6	2,100	CBD-S05-SS03-1012	100	1 / 6	21.0	**Yes**	HQ greater than one
Hexachlorobenzene	1.80 - 100	0 / 6	--	--	1,000,000	-- / --	1.00E-04	No	Not detected
Hexachlorobutadiene	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Hexachlorocyclopentadiene	3.50 - 200	0 / 6	--	--	100	-- / --	2.00	No	Not detected
Hexachloroethane	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Indeno(1,2,3-cd)pyrene	3.50 - 3.60	3 / 6	13,000	CBD-S05-SS03-1012	100	2 / 6	130	**Yes**	HQ greater than one
Isophorone	1.80 - 100	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Naphthalene	1.80 - 2.50	2 / 6	1,500	CBD-S05-SS03-1012	100	1 / 6	15.0	**Yes**	HQ greater than one
n-Nitroso-di-n-propylamine	3.50 - 200	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
n-Nitrosodiphenylamine	1.80 - 100	0 / 6	--	--	200	-- / --	0.50	No	Not detected
Nitrobenzene	1.80 - 100	0 / 6	--	--	400	-- / --	0.25	No	Not detected
Pentachlorophenol	35.0 - 2,000	0 / 6	--	--	5.00	-- / --	400	No	Not detected
Phenanthrene	1.80 - 1.80	5 / 6	27,000	CBD-S05-SS03-1012	100	2 / 6	270	**Yes**	HQ greater than one
Phenol	3.50 - 200	0 / 6	--	--	100	-- / --	2.00	No	Not detected
Pyrene	3.50 - 3.50	5 / 6	48,000	CBD-S05-SS03-1012	100	2 / 6	480	**Yes**	HQ greater than one
Low Molecular Weight PAHs	-- - --	-- / --	84,930	CBD-S05-SS03-1013	29,000	-- / --	2.93	**Yes**	HQ greater than one
High Molecular Weight PAHs	-- - --	-- / --	177,120	CBD-S05-SS03-1014	1,100	-- / --	161	**Yes**	HQ greater than one
Pesticide/Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	14.0 - 19.0	0 / 6	--	--	100	-- / --	0.19	No	Not detected
Aroclor-1221	14.0 - 19.0	0 / 6	--	--	100	-- / --	0.19	No	Not detected
Aroclor-1232	14.0 - 19.0	0 / 6	--	--	100	-- / --	0.19	No	Not detected
Aroclor-1242	14.0 - 19.0	0 / 6	--	--	100	-- / --	0.19	No	Not detected
Aroclor-1248	14.0 - 19.0	0 / 6	--	--	100	-- / --	0.19	No	Not detected
Aroclor-1254	14.0 - 19.0	3 / 6	46.0	CBD-S05-SS03-1012	100	0 / 6	0.46	No	HQ less than one
Aroclor-1260	14.0 - 19.0	4 / 6	80.0	CBD-S05-SS03-1012	100	0 / 6	0.80	No	HQ less than one
Aroclor-1262	14.0 - 19.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected
Aroclor-1268	14.0 - 19.0	0 / 6	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 5

Site 5 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Inorganics (MG/KG)									
Aluminum	-- - --	6 / 6	7,400	CBD-S05-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Antimony	-- - --	6 / 6	2.40	CBD-S05-SS03-1012	78.0	0 / 6	0.031	No	HQ less than one
Arsenic	-- - --	6 / 6	5.10	CBD-S05-SS03-1012	18.0	0 / 6	0.28	No	HQ less than one
Barium	-- - --	6 / 6	39.0	CBD-S05-SS03-1012	330	0 / 6	0.12	No	HQ less than one
Beryllium	-- - --	6 / 6	1.40	CBD-S05-SS06-1012	40.0	0 / 6	0.035	No	HQ less than one
Cadmium	-- - --	6 / 6	0.44	CBD-S05-SS03-1012	32.0	0 / 6	0.014	No	HQ less than one
Calcium [2]	-- - --	6 / 6	2,500	CBD-S05-SS03-1012	NSV	-- / --	NSV	No	Macronutrient
Chromium (hexavalent)	-- - --	1 / 1	0.17	CBD-S05-SS01-1012	0.40	0 / 1	0.43	No	HQ less than one
Chromium	-- - --	6 / 6	18.0	CBD-S05-SS03-1012	0.0075	6 / 6	2,400	**Yes**	HQ greater than one
Cobalt	-- - --	6 / 6	6.90	CBD-S05-SS06-1012	13.0	0 / 6	0.53	No	HQ less than one
Copper	-- - --	6 / 6	230	CBD-S05-SS03-1012	70.0	2 / 6	3.29	**Yes**	HQ greater than one
Cyanide	0.064 - 0.064	5 / 6	0.065	CBD-S05-SS03-1012	5.00E-03	-- / --	13.0	**Yes**	HQ greater than one
Iron	10,000 - 10,000	5 / 6	14,000	CBD-S05-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Lead	-- - --	6 / 6	140	CBD-S05-SS03-1012	120	1 / 6	1.17	**Yes**	HQ greater than one
Magnesium [2]	-- - --	6 / 6	1,300	CBD-S05-SS03-1012	NSV	-- / --	NSV	No	Macronutrient
Manganese	-- - --	6 / 6	100	CBD-S05-SS06-1012	220	0 / 6	0.45	No	HQ less than one
Mercury	0.017 - 0.017	5 / 6	0.11	CBD-S05-SS03-1012	0.058	3 / 6	1.90	**Yes**	HQ greater than one
Nickel	-- - --	6 / 6	15.0	CBD-S05-SS06-1012	38.0	0 / 6	0.39	No	HQ less than one
Potassium [2]	-- - --	6 / 6	1,000	CBD-S05-SS03-1012	NSV	-- / --	NSV	No	Macronutrient
Selenium	-- - --	6 / 6	0.47	CBD-S05-SS06-1012	0.52	0 / 6	0.90	No	HQ less than one
Silver	-- - --	6 / 6	0.68	CBD-S05-SS06-1012	560	0 / 6	0.0012	No	HQ less than one
Sodium 2	9.40 - 28.0	1 / 6	22.0	CBD-S05-SS04-1012	NSV	-- / --	NSV	No	Macronutrient
Thallium	-- - --	6 / 6	0.13	CBD-S05-SS03-1012	0.0010	6 / 6	130	**Yes**	HQ greater than one
Vanadium	-- - --	6 / 6	40.0	CBD-S05-SS03-1012	0.50	6 / 6	80.0	**Yes**	HQ greater than one
Zinc	12.0 - 200	1 / 6	5.90	CBD-S05-SS05-1012	120	0 / 6	0.049	No	HQ less than one
Other Parameters (various units)									
pH (PH)	-- - --	6 / 6	6.20	CBD-S05-SS03-1012	NSV	-- / --	NSV	--	--
Total organic carbon (TOC) (MG/KG)	-- - --	6 / 6	16,000	CBD-S05-SS06-1012	NSV	-- / --	NSV	--	--

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

2 - Macronutrient - Not considered to be a COPC

COPC - Contaminant of Potential Concern

HQ - Hazard Quotient

MG/KG - Milligrams per kilogram

NSV - No Screening Value

UG/KG - Micrograms per kilogram

TABLE 6

Site 7 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.43 - 0.70	0 / 9	--	--	300	-- / --	0.0023	No	Not detected
1,1,2,2-Tetrachloroethane	0.43 - 0.70	0 / 9	--	--	300	-- / --	0.0023	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.43 - 0.70	0 / 9	--	--	300	-- / --	0.0023	No	Not detected
1,1-Dichloroethane	0.21 - 0.35	0 / 9	--	--	300	-- / --	0.0012	No	Not detected
1,1-Dichloroethene	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
1,2,3-Trichlorobenzene	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.43 - 0.70	0 / 9	--	--	100	-- / --	0.0070	No	Not detected
1,2-Dibromo-3-chloropropane	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.43 - 0.70	0 / 9	--	--	5,000	-- / --	1.40E-04	No	Not detected
1,2-Dichlorobenzene	0.43 - 0.70	0 / 9	--	--	100	-- / --	0.0070	No	Not detected
1,2-Dichloroethane	0.43 - 0.70	0 / 9	--	--	870,000	-- / --	8.05E-07	No	Not detected
1,2-Dichloropropane	0.43 - 0.70	0 / 9	--	--	300	-- / --	0.0023	No	Not detected
1,3-Dichlorobenzene	0.21 - 0.35	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
1,4-Dichlorobenzene	0.21 - 0.35	0 / 9	--	--	100	-- / --	0.0035	No	Not detected
2-Butanone	-- - --	9 / 9	8.70	CBD-S07-SS08-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
2-Hexanone	0.43 - 0.70	1 / 9	0.55	CBD-S07-SS05-1012	12,600	0 / 9	4.37E-05	No	HQ less than one
4-Methyl-2-pentanone	0.43 - 0.70	0 / 9	--	--	100,000	-- / --	7.00E-06	No	Not detected
Acetone	-- - --	9 / 9	250	CBD-S07-SS05-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Benzene	0.43 - 0.70	0 / 9	--	--	100	-- / --	0.0070	No	Not detected
Bromochloromethane	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
Bromodichloromethane	0.43 - 0.70	0 / 9	--	--	450,000	-- / --	1.56E-06	No	Not detected
Bromoform	0.21 - 0.35	0 / 9	--	--	1,147,000	-- / --	3.05E-07	No	Not detected
Bromomethane	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
Carbon disulfide	0.23 - 2.30	0 / 9	--	--	94.1	-- / --	0.024	No	Not detected
Carbon tetrachloride	0.21 - 0.35	0 / 9	--	--	300	-- / --	0.0012	No	Not detected
Chlorobenzene	0.21 - 0.35	0 / 9	--	--	100	-- / --	0.0035	No	Not detected
Chloroethane	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
Chloroform	0.14 - 0.25	0 / 9	--	--	300	-- / --	8.33E-04	No	Not detected
Chloromethane	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.21 - 0.35	0 / 9	--	--	300	-- / --	0.0012	No	Not detected
cis-1,3-Dichloropropene	0.21 - 0.35	0 / 9	--	--	300	-- / --	0.0012	No	Not detected
Cyclohexane	0.43 - 0.70	0 / 9	--	--	100	-- / --	0.0070	No	Not detected
Dibromochloromethane	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
Ethylbenzene	0.43 - 0.70	0 / 9	--	--	100	-- / --	0.0070	No	Not detected
Isopropylbenzene	0.21 - 0.35	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
m- and p-Xylene	0.43 - 0.70	1 / 9	0.40	CBD-S07-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Methyl acetate	1.10 - 5.80	1 / 9	8.10	CBD-S07-SS05-1012	NSV	-- / --	NSV	**Yes**	No screening value
Methylcyclohexane	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 6

Site 7 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Methylene chloride	0.43 - 0.70	0 / 9	--	--	300	-- / --	0.0023	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.43 - 0.70	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
o-Xylene	0.21 - 0.35	1 / 9	0.15	CBD-S07-SS03-1012	NSV	-- / --	NSV	**Yes**	No screening value
Styrene	0.21 - 0.35	0 / 9	--	--	100	-- / --	0.0035	No	Not detected
Tetrachloroethene	0.43 - 0.70	0 / 9	--	--	300	-- / --	0.0023	No	Not detected
Toluene	0.27 - 0.87	1 / 9	2.90	CBD-S07-SS01-1012	100	0 / 9	0.029	No	HQ less than one
trans-1,2-Dichloroethene	0.21 - 0.35	0 / 9	--	--	300	-- / --	0.0012	No	Not detected
trans-1,3-Dichloropropene	0.43 - 0.70	0 / 9	--	--	300	-- / --	0.0023	No	Not detected
Trichloroethene	0.21 - 0.35	0 / 9	--	--	300	-- / --	0.0012	No	Not detected
Trichlorofluoromethane (Freon-11)	0.21 - 0.35	0 / 9	--	--	16,400	-- / --	2.13E-05	No	Not detected
Vinyl chloride	0.21 - 0.35	0 / 9	--	--	300	-- / --	0.0012	No	Not detected
Pesticide/Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	14.0 - 76.0	0 / 9	--	--	100	-- / --	0.76	No	Not detected
Aroclor-1221	14.0 - 76.0	0 / 9	--	--	100	-- / --	0.76	No	Not detected
Aroclor-1232	14.0 - 76.0	0 / 9	--	--	100	-- / --	0.76	No	Not detected
Aroclor-1242	14.0 - 76.0	0 / 9	--	--	100	-- / --	0.76	No	Not detected
Aroclor-1248	14.0 - 76.0	0 / 9	--	--	100	-- / --	0.76	No	Not detected
Aroclor-1254	14.0 - 76.0	2 / 9	50.0	CBD-S07-SS07-1012	100	0 / 9	0.50	No	HQ less than one
Aroclor-1260	14.0 - 14.0	7 / 9	940	CBD-S07-SS01-1012	100	3 / 9	9.40	**Yes**	HQ greater than one
Aroclor-1262	14.0 - 76.0	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
Aroclor-1268	14.0 - 76.0	0 / 9	--	--	NSV	-- / --	NSV	No	Not detected
Inorganics (MG/KG)									
Aluminum	-- - --	9 / 9	6,600	CBD-S07-SS01-1012	NSV	-- / --	NSV	No	No screening value
Antimony	-- - --	9 / 9	0.40	CBD-S07-SS07-1012	78.0	0 / 9	0.0051	No	HQ less than one
Arsenic	-- - --	9 / 9	3.50	CBD-S07-SS07-1012	18.0	0 / 9	0.19	No	HQ less than one
Barium	-- - --	9 / 9	33.0	CBD-S07-SS07-1012	330	0 / 9	0.10	No	HQ less than one
Beryllium	-- - --	9 / 9	0.45	CBD-S07-SS07-1012	40.0	0 / 9	0.011	No	HQ less than one
Cadmium	-- - --	9 / 9	0.52	CBD-S07-SS07-1012	32.0	0 / 9	0.016	No	HQ less than one
Calcium [2]	-- - --	9 / 9	16,000	CBD-S07-SS07-1012	NSV	-- / --	NSV	No	Macronutrient
Chromium (hexavalent)	-- - --	1 / 1	0.30	CBD-S07-SS01-1012	0.40	0 / 1	0.75	No	HQ less than one
Chromium	-- - --	9 / 9	21.0	CBD-S07-SS01-1012	0.0075	9 / 9	2,800	**Yes**	HQ greater than one
Cobalt	-- - --	9 / 9	2.60	CBD-S07-SS03-1012	13.0	0 / 9	0.20	No	HQ less than one
Copper	-- - --	9 / 9	9.90	CBD-S07-SS07-1012	70.0	0 / 9	0.14	No	HQ less than one
Cyanide	0.053 - 0.057	5 / 9	0.32	CBD-S07-SS07-1012	0.01	-- / --	64	**Yes**	HQ greater than one
Iron	-- - --	9 / 9	15,000	CBD-S07-SS07-1012	NSV	-- / --	NSV	**Yes**	No screening value
Lead	-- - --	9 / 9	64.0	CBD-S07-SS08-1012	120	0 / 9	0.53	No	HQ less than one
Magnesium [2]	-- - --	9 / 9	4,300	CBD-S07-SS07-1012	NSV	-- / --	NSV	No	Macronutrient
Manganese	-- - --	9 / 9	130	CBD-S07-SS07-1012	220	0 / 9	0.59	No	HQ less than one
Mercury	0.017 - 0.017	8 / 9	0.047	CBD-S07-SS07-1012	0.058	0 / 9	0.81	No	HQ less than one
Nickel	-- - --	9 / 9	19.0	CBD-S07-SS07-1012	38.0	0 / 9	0.50	No	HQ less than one

TABLE 6

Site 7 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Potassium [2]	-- - --	9 / 9	1,000	CBD-S07-SS07-1012	NSV	-- / --	NSV	No	Macronutrient
Selenium	0.068 - 0.32	1 / 9	0.34	CBD-S07-SS07-1012	0.52	0 / 9	0.65	No	HQ less than one
Silver	-- - --	9 / 9	0.065	CBD-S07-SS07-1012	560	0 / 9	1.16E-04	No	HQ less than one
Sodium [2]	6.60 - 50.0	1 / 9	110	CBD-S07-SS09-1012	NSV	-- / --	NSV	No	Macronutrient
Thallium	-- - --	9 / 9	0.20	CBD-S07-SS01-1012	0.0010	9 / 9	200	**Yes**	HQ greater than one
Vanadium	-- - --	9 / 9	78.0	CBD-S07-SS07-1012	0.50	9 / 9	156	**Yes**	HQ greater than one
Zinc	-- - --	9 / 9	260	CBD-S07-SS07-1012	120	2 / 9	2.17	**Yes**	HQ greater than one
Other Parameters (various units)									
pH (PH)	-- - --	9 / 9	7.90	CBD-S07-SS03-1012	NSV	-- / --	NSV	--	--
Total organic carbon (TOC) (MG/KG)	-- - --	9 / 9	15,000	CBD-S07-SS07-1012	NSV	-- / --	NSV	--	--

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

2 - Macronutrient - Not considered to be a COPC

COPC - Contaminant of Potential Concern

HQ - Hazard Quotient

MG/KG - Milligrams per kilogram

NSV - No Screening Value

UG/KG - Micrograms per kilogram

TABLE 7

Site 9 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.47 - 0.66	0 / 4	--	--	300	-- / --	0.0022	No	Not detected
1,1,2,2-Tetrachloroethane	0.47 - 0.66	0 / 4	--	--	300	-- / --	0.0022	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-11	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.47 - 0.66	0 / 4	--	--	300	-- / --	0.0022	No	Not detected
1,1-Dichloroethane	0.23 - 0.33	0 / 4	--	--	300	-- / --	0.0011	No	Not detected
1,1-Dichloroethene	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
1,2,3-Trichlorobenzene	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.47 - 0.66	0 / 4	--	--	100	-- / --	0.0066	No	Not detected
1,2-Dibromo-3-chloropropane	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.47 - 0.66	0 / 4	--	--	5,000	-- / --	1.32E-04	No	Not detected
1,2-Dichlorobenzene	0.47 - 0.66	0 / 4	--	--	100	-- / --	0.0066	No	Not detected
1,2-Dichloroethane	0.47 - 0.66	0 / 4	--	--	870,000	-- / --	7.59E-07	No	Not detected
1,2-Dichloropropane	0.47 - 0.66	0 / 4	--	--	300	-- / --	0.0022	No	Not detected
1,3-Dichlorobenzene	0.23 - 0.33	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
1,4-Dichlorobenzene	0.23 - 0.33	0 / 4	--	--	100	-- / --	0.0033	No	Not detected
2-Butanone	-- - --	4 / 4	8.10	CBD-S09-SS01-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
2-Hexanone	0.47 - 0.66	1 / 4	7.40	CBD-S09-SS01-1012	12,600	0 / 4	5.87E-04	No	HQ less than one
4-Methyl-2-pentanone	0.47 - 0.66	0 / 4	--	--	100,000	-- / --	6.60E-06	No	Not detected
Acetone	-- - --	4 / 4	67.0	CBD-S09-SS04-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Benzene	0.47 - 0.63	2 / 4	4.30	CBD-S09-SS04-1012	100	0 / 4	0.043	No	HQ less than one
Bromochloromethane	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Bromodichloromethane	0.47 - 0.66	0 / 4	--	--	450,000	-- / --	1.47E-06	No	Not detected
Bromoform	0.23 - 0.33	0 / 4	--	--	1,147,000	-- / --	2.88E-07	No	Not detected
Bromomethane	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Carbon disulfide	0.26 - 1.20	2 / 4	8.40	CBD-S09-SS03-1012	94.1	0 / 4	0.09	No	HQ less than one
Carbon tetrachloride	0.23 - 0.33	0 / 4	--	--	300	-- / --	0.0011	No	Not detected
Chlorobenzene	0.23 - 0.33	0 / 4	--	--	100	-- / --	0.0033	No	Not detected
Chloroethane	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Chloroform	0.18 - 0.29	0 / 4	--	--	300	-- / --	9.67E-04	No	Not detected
Chloromethane	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.23 - 0.33	0 / 4	--	--	300	-- / --	0.0011	No	Not detected
cis-1,3-Dichloropropene	0.23 - 0.33	0 / 4	--	--	300	-- / --	0.0011	No	Not detected
Cyclohexane	0.47 - 0.63	1 / 4	3.40	CBD-S09-SS04-1012	100	0 / 4	0.034	No	HQ less than one
Dibromochloromethane	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Ethylbenzene	0.47 - 0.63	1 / 4	1.70	CBD-S09-SS04-1012	100	0 / 4	0.017	No	HQ less than one
Isopropylbenzene	0.23 - 0.32	1 / 4	1.10	CBD-S09-SS04-1012	NSV	-- / --	NSV	**Yes**	No screening value
m- and p-Xylene	0.47 - 0.63	1 / 4	4.30	CBD-S09-SS04-1012	NSV	-- / --	NSV	**Yes**	No screening value
Methyl acetate	1.10 - 4.10	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Methylcyclohexane	0.47 - 0.63	1 / 4	6.50	CBD-S09-SS04-1012	NSV	-- / --	NSV	**Yes**	No screening value

TABLE 7

Site 9 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Methylene chloride	0.47 - 0.66	0 / 4	--	--	300	-- / --	0.0022	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.47 - 0.66	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
o-Xylene	0.23 - 0.32	1 / 4	2.90	CBD-S09-SS04-1012	NSV	-- / --	NSV	**Yes**	No screening value
Styrene	0.23 - 0.32	1 / 4	1.80	CBD-S09-SS04-1012	100	0 / 4	0.018	No	HQ less than one
Tetrachloroethene	0.47 - 0.66	0 / 4	--	--	300	-- / --	0.0022	No	Not detected
Toluene	0.28 - 0.53	1 / 4	8.60	CBD-S09-SS04-1012	100	0 / 4	0.086	No	HQ less than one
trans-1,2-Dichloroethene	0.23 - 0.33	0 / 4	--	--	300	-- / --	0.0011	No	Not detected
trans-1,3-Dichloropropene	0.47 - 0.66	0 / 4	--	--	300	-- / --	0.0022	No	Not detected
Trichloroethene	0.23 - 0.33	0 / 4	--	--	300	-- / --	0.0011	No	Not detected
Trichlorofluoromethane (Freon-11)	0.23 - 0.33	0 / 4	--	--	16,400	-- / --	2.01E-05	No	Not detected
Vinyl chloride	0.23 - 0.33	0 / 4	--	--	300	-- / --	0.0011	No	Not detected
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	35.0 - 78.0	0 / 4	--	--	600	-- / --	0.13	No	Not detected
1,2,4,5-Tetrachlorobenzene	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
2,2'-Oxybis(1-chloropropane)	7.10 - 15.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
2,3,4,6-Tetrachlorophenol	7.10 - 15.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
2,4,5-Trichlorophenol	35.0 - 78.0	0 / 4	--	--	100	-- / --	0.78	No	Not detected
2,4,6-Trichlorophenol	7.10 - 15.0	0 / 4	--	--	100	-- / --	0.15	No	Not detected
2,4-Dichlorophenol	7.00 - 15.0	0 / 4	--	--	100	-- / --	0.15	No	Not detected
2,4-Dimethylphenol	71.0 - 150	0 / 4	--	--	100	-- / --	1.50	No	Not detected
2,4-Dinitrophenol	350 - 780	0 / 4	--	--	100	-- / --	7.80	No	Not detected
2,4-Dinitrotoluene	35.0 - 78.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
2,6-Dinitrotoluene	7.10 - 15.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
2-Chloronaphthalene	7.10 - 15.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
2-Chlorophenol	7.10 - 15.0	0 / 4	--	--	100	-- / --	0.15	No	Not detected
2-Methylnaphthalene	3.50 - 7.80	0 / 4	--	--	3,240	-- / --	0.002	No	Not detected
2-Methylphenol	14.0 - 31.0	0 / 4	--	--	100	-- / --	0.31	No	Not detected
2-Nitroaniline	35.0 - 78.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
2-Nitrophenol	7.10 - 15.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
3,3'-Dichlorobenzidine	710 - 1,500	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
3-Nitroaniline	71.0 - 150	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
4,6-Dinitro-2-methylphenol	35.0 - 78.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
4-Bromophenyl-phenylether	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloro-3-methylphenol	14.0 - 31.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloroaniline	35.0 - 78.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
4-Chlorophenyl-phenylether	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
4-Methylphenol	7.10 - 15.0	0 / 4	--	--	100	-- / --	0.15	No	Not detected
4-Nitroaniline	71.0 - 150	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
4-Nitrophenol	71.0 - 150	0 / 4	--	--	100	-- / --	1.50	No	Not detected
Acenaphthene	3.50 - 7.80	0 / 4	--	--	100	-- / --	0.078	No	Not detected
Acenaphthylene	3.50 - 7.80	0 / 4	--	--	100	-- / --	0.078	No	Not detected

TABLE 7

Site 9 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Acetophenone	35.0 - 78.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Anthracene	3.60 - 3.90	2 / 4	12.0	CBD-S09-SS04-1012	100	0 / 4	0.12	No	HQ less than one
Atrazine	35.0 - 78.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Benzaldehyde	35.0 - 78.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Benzo(a)anthracene	3.60 - 3.60	3 / 4	150	CBD-S09-SS04-1012	100	1 / 4	1.50	**Yes**	HQ greater than one
Benzo(a)pyrene	29.0 - 31.0	2 / 4	46.0	CBD-S09-SS04-1012	100	0 / 4	0.46	No	HQ less than one
Benzo(b)fluoranthene	7.10 - 7.10	3 / 4	370	CBD-S09-SS04-1012	100	1 / 4	3.70	**Yes**	HQ greater than one
Benzo(g,h,i)perylene	3.60 - 12.0	1 / 4	91.0	CBD-S09-SS04-1012	100	0 / 4	0.91	No	HQ less than one
Benzo(k)fluoranthene	5.40 - 8.00	1 / 4	91.0	CBD-S09-SS04-1012	100	0 / 4	0.91	No	HQ less than one
bis(2-Chloroethoxy)methane	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Chloroethyl)ether	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Ethylhexyl)phthalate	9.40 - 9.40	3 / 4	91.0	CBD-S09-SS04-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Butylbenzylphthalate	7.10 - 15.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Caprolactam	35.0 - 78.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Carbazole	71.0 - 150	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Chrysene	3.60 - 13.0	1 / 4	170	CBD-S09-SS04-1012	100	1 / 4	1.70	**Yes**	HQ greater than one
Dibenz(a,h)anthracene	7.10 - 31.0	0 / 4	--	--	100	-- / --	0.31	No	Not detected
Dibenzofuran	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Diethylphthalate	7.90 - 15.0	0 / 4	--	--	1,000	-- / --	0.015	No	Not detected
Dimethyl phthalate	7.10 - 15.0	0 / 4	--	--	2,000	-- / --	0.0075	No	Not detected
Di-n-butylphthalate	35.0 - 78.0	0 / 4	--	--	200,000	-- / --	3.90E-04	No	Not detected
Di-n-octylphthalate	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Fluoranthene	-- - --	4 / 4	210	CBD-S09-SS04-1012	100	1 / 4	2.10	**Yes**	HQ greater than one
Fluorene	3.50 - 7.80	0 / 4	--	--	100	-- / --	0.078	No	Not detected
Hexachlorobenzene	3.50 - 7.80	0 / 4	--	--	1,000,000	-- / --	7.80E-06	No	Not detected
Hexachlorobutadiene	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Hexachlorocyclopentadiene	7.10 - 15.0	0 / 4	--	--	100	-- / --	0.15	No	Not detected
Hexachloroethane	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Indeno(1,2,3-cd)pyrene	7.10 - 11.0	1 / 4	88.0	CBD-S09-SS04-1012	100	0 / 4	0.88	No	HQ less than one
Isophorone	3.50 - 7.80	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
Naphthalene	3.50 - 7.80	0 / 4	--	--	100	-- / --	0.078	No	Not detected
n-Nitroso-di-n-propylamine	7.10 - 15.0	0 / 4	--	--	NSV	-- / --	NSV	No	Not detected
n-Nitrosodiphenylamine	3.50 - 7.80	0 / 4	--	--	200	-- / --	0.039	No	Not detected
Nitrobenzene	3.50 - 7.80	0 / 4	--	--	400	-- / --	0.020	No	Not detected
Pentachlorophenol	71.0 - 150	0 / 4	--	--	5.00	-- / --	30.0	No	Not detected
Phenanthrene	-- - --	4 / 4	130	CBD-S09-SS04-1012	100	1 / 4	1.30	**Yes**	HQ greater than one
Phenol	7.00 - 15.0	0 / 4	--	--	100	-- / --	0.15	No	Not detected
Pyrene	-- - --	4 / 4	320	CBD-S09-SS04-1012	100	1 / 4	3.20	**Yes**	HQ greater than one
Low Molecular Weight PAHs	-- - --	-- / --	352	CBD-S09-SS04-1012	29,000	-- / --	0.01	No	HQ less than one
High Molecular Weight PAHs	-- - --	-- / --	1326	CBD-S09-SS04-1012	1,100	-- / --	1.21	**Yes**	HQ greater than one
Inorganics (MG/KG)									

TABLE 7

Site 9 Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Aluminum	-- - --	4 / 4	4,700	CBD-S09-SS03-1012	NSV	-- / --	NSV	No	No screening value
Antimony	0.095 - 0.13	2 / 4	0.88	CBD-S09-SS03-1012	78.0	0 / 4	0.011	No	HQ less than one
Arsenic	-- - --	4 / 4	2.70	CBD-S09-SS03-1012	18.0	0 / 4	0.15	No	HQ less than one
Barium	-- - --	4 / 4	22.0	CBD-S09-SS03-1012	330	0 / 4	0.067	No	HQ less than one
Beryllium	-- - --	4 / 4	0.30	CBD-S09-SS02-1012	40.0	0 / 4	0.0075	No	HQ less than one
Cadmium	-- - --	4 / 4	0.29	CBD-S09-SS02-1012	32.0	0 / 4	0.0091	No	HQ less than one
Calcium [2]	-- - --	4 / 4	7,900	CBD-S09-SS04-1012	NSV	-- / --	NSV	No	Macronutrient
Chromium (hexavalent)	-- - --	4 / 4	1.05	CBD-S09-SS04-1012	0.40	3 / 4	2.63	**Yes**	HQ greater than one
Chromium	-- - --	4 / 4	18.0	CBD-S09-SS02-1012	0.0075	4 / 4	2,400	**Yes**	HQ greater than one
Cobalt	-- - --	4 / 4	2.10	CBD-S09-SS02-1012	13.0	0 / 4	0.16	No	HQ less than one
Copper	-- - --	4 / 4	13.0	CBD-S09-SS02-1012	70.0	0 / 4	0.19	No	HQ less than one
Cyanide	0.053 - 0.058	0 / 4	--	--	5.00E-03	-- / --	11.60	No	Not detected
Iron	-- - --	4 / 4	13,000	CBD-S09-SS03-1012	NSV	-- / --	NSV	No	No screening value
Lead	-- - --	4 / 4	28.0	CBD-S09-SS02-1012	120	0 / 4	0.23	No	HQ less than one
Magnesium [2]	-- - --	4 / 4	1,800	CBD-S09-SS02-1012	NSV	-- / --	NSV	No	Macronutrient
Manganese	-- - --	4 / 4	61.0	CBD-S09-SS03-1012	220	0 / 4	0.28	No	HQ less than one
Mercury	0.017 - 0.017	3 / 4	0.047	CBD-S09-SS02-1012	0.058	0 / 4	0.81	No	HQ less than one
Nickel	-- - --	4 / 4	9.00	CBD-S09-SS02-1012	38.0	0 / 4	0.24	No	HQ less than one
Potassium [2]	-- - --	4 / 4	670	CBD-S09-SS03-1012	NSV	-- / --	NSV	No	Macronutrient
Selenium	0.087 - 0.087	3 / 4	0.50	CBD-S09-SS03-1012	0.52	0 / 4	0.96	No	HQ less than one
Silver	-- - --	4 / 4	3.90	CBD-S09-SS01-1012	560	0 / 4	0.0070	No	HQ less than one
Sodium [2]	25.0 - 57.0	0 / 4	--	--	NSV	-- / --	NSV	No	Macronutrient
Thallium	0.059 - 0.059	3 / 4	0.15	CBD-S09-SS01-1012	0.0010	3 / 4	150	**Yes**	HQ greater than one
Vanadium	-- - --	4 / 4	17.0	CBD-S09-SS03-1012	0.50	4 / 4	34.0	**Yes**	HQ greater than one
Zinc	15.0 - 15.0	3 / 4	47.0	CBD-S09-SS02-1012	120	0 / 4	0.39	No	HQ less than one
Other Parameters (various units)									
pH (PH)	-- - --	4 / 4	12.0	CBD-S09-SS04-1012	NSV	-- / --	NSV	--	--
Total organic carbon (TOC) (MG/KG)	-- - --	4 / 4	4,400	CBD-S09-SS03-1012	NSV	-- / --	NSV	--	--

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

2 - Macronutrient - Not considered to be a COPC

COPC - Contaminant of Potential Concern

HQ - Hazard Quotient

MG/KG - Milligrams per kilogram

NSV - No Screening Value

UG/KG - Micrograms per kilogram

TABLE 8

AOC-C Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.44 - 0.63	0 / 5	--	--	300	-- / --	0.0021	No	Not detected
1,1,2,2-Tetrachloroethane	0.44 - 0.63	0 / 5	--	--	300	-- / --	0.0021	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-11	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.44 - 0.63	0 / 5	--	--	300	-- / --	0.0021	No	Not detected
1,1-Dichloroethane	0.22 - 0.31	0 / 5	--	--	300	-- / --	0.0010	No	Not detected
1,1-Dichloroethene	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2,3-Trichlorobenzene	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.44 - 0.63	0 / 5	--	--	100	-- / --	0.0063	No	Not detected
1,2-Dibromo-3-chloropropane	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.44 - 0.63	0 / 5	--	--	5,000	-- / --	1.26E-04	No	Not detected
1,2-Dichlorobenzene	0.44 - 0.63	0 / 5	--	--	100	-- / --	0.0063	No	Not detected
1,2-Dichloroethane	0.44 - 0.63	0 / 5	--	--	870,000	-- / --	7.24E-07	No	Not detected
1,2-Dichloropropane	0.44 - 0.63	0 / 5	--	--	300	-- / --	0.0021	No	Not detected
1,3-Dichlorobenzene	0.22 - 0.31	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
1,4-Dichlorobenzene	0.22 - 0.31	0 / 5	--	--	100	-- / --	0.0031	No	Not detected
2-Butanone	-- - --	5 / 5	23.0	CBD-AOC-SS02-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
2-Hexanone	0.44 - 0.44	4 / 5	1.40	CBD-AOC-SS02-1012	12,600	0 / 5	1.11E-04	No	HQ less than one
4-Methyl-2-pentanone	0.44 - 0.63	0 / 5	--	--	100,000	-- / --	6.30E-06	No	Not detected
Acetone	140 - 140	4 / 5	770	CBD-AOC-SS01-1012	NSV	-- / --	NSV	No	Common laboratory contaminant
Benzene	0.44 - 0.63	0 / 5	--	--	100	-- / --	0.0063	No	Not detected
Bromochloromethane	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Bromodichloromethane	0.44 - 0.63	0 / 5	--	--	450,000	-- / --	1.40E-06	No	Not detected
Bromoform	0.22 - 0.31	0 / 5	--	--	1,147,000	-- / --	2.70E-07	No	Not detected
Bromomethane	0.38 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Carbon disulfide	0.38 - 0.51	0 / 5	--	--	94.1	-- / --	0.005	No	Not detected
Carbon tetrachloride	0.22 - 0.31	0 / 5	--	--	300	-- / --	0.0010	No	Not detected
Chlorobenzene	0.22 - 0.31	0 / 5	--	--	100	-- / --	0.0031	No	Not detected
Chloroethane	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Chloroform	0.21 - 0.31	0 / 5	--	--	300	-- / --	0.0010	No	Not detected
Chloromethane	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.22 - 0.31	0 / 5	--	--	300	-- / --	0.0010	No	Not detected
cis-1,3-Dichloropropene	0.22 - 0.31	0 / 5	--	--	300	-- / --	0.0010	No	Not detected
Cyclohexane	0.44 - 0.63	0 / 5	--	--	100	-- / --	0.0063	No	Not detected
Dibromochloromethane	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Ethylbenzene	0.44 - 0.63	0 / 5	--	--	100	-- / --	0.0063	No	Not detected
Isopropylbenzene	0.22 - 0.31	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
m- and p-Xylene	0.44 - 0.58	1 / 5	0.48	CBD-AOC-SS01-1012	NSV	-- / --	NSV	**Yes**	No Screening Value
Methyl acetate	0.98 - 7.40	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Methylcyclohexane	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Methylene chloride	0.44 - 0.63	0 / 5	--	--	300	-- / --	0.0021	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.44 - 0.63	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
o-Xylene	0.22 - 0.31	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 8

AOC-C Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Styrene	0.22 - 0.31	0 / 5	--	--	100	-- / --	0.0031	No	Not detected
Tetrachloroethene	0.44 - 0.63	0 / 5	--	--	300	-- / --	0.0021	No	Not detected
Toluene	0.47 - 0.47	4 / 5	22.0	CBD-AOC-SS04-1012	100	0 / 5	0.22	No	HQ less than one
trans-1,2-Dichloroethene	0.22 - 0.31	0 / 5	--	--	300	-- / --	0.0010	No	Not detected
trans-1,3-Dichloropropene	0.44 - 0.63	0 / 5	--	--	300	-- / --	0.0021	No	Not detected
Trichloroethene	0.22 - 0.31	0 / 5	--	--	300	-- / --	0.0010	No	Not detected
Trichlorofluoromethane (Freon-11)	0.22 - 0.31	0 / 5	--	--	16,400	-- / --	1.89E-05	No	Not detected
Vinyl chloride	0.22 - 0.31	0 / 5	--	--	300	-- / --	0.0010	No	Not detected
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	18.0 - 19.0	0 / 5	--	--	600	-- / --	0.032	No	Not detected
1,2,4,5-Tetrachlorobenzene	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,2'-Oxybis(1-chloropropane)	3.50 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,3,4,6-Tetrachlorophenol	3.50 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,4,5-Trichlorophenol	18.0 - 19.0	0 / 5	--	--	100	-- / --	0.19	No	Not detected
2,4,6-Trichlorophenol	3.50 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
2,4-Dichlorophenol	3.50 - 3.70	0 / 5	--	--	100	-- / --	0.037	No	Not detected
2,4-Dimethylphenol	35.0 - 38.0	0 / 5	--	--	100	-- / --	0.38	No	Not detected
2,4-Dinitrophenol	180 - 190	0 / 5	--	--	100	-- / --	1.90	No	Not detected
2,4-Dinitrotoluene	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2,6-Dinitrotoluene	3.50 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Chloronaphthalene	3.50 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Chlorophenol	3.50 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
2-Methylnaphthalene	1.80 - 1.90	0 / 5	--	--	3,240	-- / --	0.001	No	Not detected
2-Methylphenol	7.00 - 7.40	0 / 5	--	--	100	-- / --	0.074	No	Not detected
2-Nitroaniline	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
2-Nitrophenol	3.50 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
3,3'-Dichlorobenzidine	350 - 380	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
3-Nitroaniline	35.0 - 38.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4,6-Dinitro-2-methylphenol	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Bromophenyl-phenylether	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloro-3-methylphenol	7.00 - 7.40	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chloroaniline	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Chlorophenyl-phenylether	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Methylphenol	3.50 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
4-Nitroaniline	35.0 - 38.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
4-Nitrophenol	35.0 - 38.0	0 / 5	--	--	100	-- / --	0.38	No	Not detected
Acenaphthene	1.80 - 1.90	1 / 5	1.40	CBD-AOC-SS03-1012	100	0 / 5	0.014	No	HQ less than one
Acenaphthylene	1.80 - 1.90	0 / 5	--	--	100	-- / --	0.019	No	Not detected
Acetophenone	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Anthracene	1.80 - 1.90	1 / 5	1.80	CBD-AOC-SS03-1012	100	0 / 5	0.018	No	HQ less than one
Atrazine	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Benzaldehyde	18.0 - 18.0	2 / 4	200	CBD-AOC-SS02-1012	NSV	-- / --	NSV	**Yes**	No Screening Value
Benzo(a)anthracene	1.80 - 17.0	1 / 5	4.10	CBD-AOC-SS02-1012	100	0 / 5	0.041	No	HQ less than one
Benzo(a)pyrene	2.80 - 7.60	0 / 5	--	--	100	-- / --	0.076	No	Not detected

TABLE 8

AOC-C Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Benzo(b)fluoranthene	3.50 - 18.0	1 / 5	2.20	CBD-AOC-SS02-1012	100	0 / 5	0.022	No	HQ less than one
Benzo(g,h,i)perylene	1.80 - 6.80	0 / 5	--	--	100	-- / --	0.068	No	Not detected
Benzo(k)fluoranthene	3.50 - 13.0	0 / 5	--	--	100	-- / --	0.13	No	Not detected
bis(2-Chloroethoxy)methane	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Chloroethyl)ether	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
bis(2-Ethylhexyl)phthalate	7.40 - 15.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Butylbenzylphthalate	3.50 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Caprolactam	18.0 - 19.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Carbazole	35.0 - 38.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Chrysene	1.10 - 14.0	0 / 5	--	--	100	-- / --	0.14	No	Not detected
Dibenz(a,h)anthracene	2.80 - 7.60	0 / 5	--	--	100	-- / --	0.076	No	Not detected
Dibenzofuran	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Diethylphthalate	9.90 - 13.0	0 / 5	--	--	1,000	-- / --	0.013	No	Not detected
Dimethyl phthalate	2.50 - 3.50	1 / 5	2.20	CBD-AOC-SS02-1012	2,000	0 / 5	0.0011	No	HQ less than one
Di-n-butylphthalate	16.0 - 19.0	0 / 5	--	--	200,000	-- / --	9.50E-05	No	Not detected
Di-n-octylphthalate	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Fluoranthene	1.80 - 30.0	1 / 5	5.60	CBD-AOC-SS02-1012	100	0 / 5	0.056	No	HQ less than one
Fluorene	1.10 - 1.90	0 / 5	--	--	100	-- / --	0.019	No	Not detected
Hexachlorobenzene	1.80 - 1.90	0 / 5	--	--	1,000,000	-- / --	1.90E-06	No	Not detected
Hexachlorobutadiene	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Hexachlorocyclopentadiene	3.50 - 3.80	0 / 5	--	--	100	-- / --	0.038	No	Not detected
Hexachloroethane	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Indeno(1,2,3-cd)pyrene	3.50 - 6.80	0 / 5	--	--	100	-- / --	0.068	No	Not detected
Isophorone	1.80 - 1.90	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Naphthalene	1.80 - 1.90	0 / 5	--	--	100	-- / --	0.019	No	Not detected
n-Nitroso-di-n-propylamine	3.50 - 3.80	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
n-Nitrosodiphenylamine	1.80 - 1.90	0 / 5	--	--	200	-- / --	0.0095	No	Not detected
Nitrobenzene	1.80 - 1.90	0 / 5	--	--	400	-- / --	0.0048	No	Not detected
Pentachlorophenol	35.0 - 38.0	0 / 5	--	--	5.00	-- / --	7.60	No	Not detected
Phenanthrene	1.10 - 11.0	1 / 5	1.90	CBD-AOC-SS02-1012	100	0 / 5	0.019	No	HQ less than one
Phenol	3.50 - 3.70	0 / 5	--	--	100	-- / --	0.037	No	Not detected
Pyrene	2.10 - 35.0	1 / 5	6.00	CBD-AOC-SS02-1012	100	0 / 5	0.060	No	HQ less than one
Low Molecular Weight PAHs	-- - --	-- / --	7.50	CBD-AOC-SS02-1013	29,000	-- / --	0.0003	No	HQ less than one
High Molecular Weight PAHs	-- - --	-- / --	12.30	CBD-AOC-SS02-1014	1,100	-- / --	0.011	No	HQ less than one
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1221	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1232	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1242	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1248	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1254	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1260	14.0 - 15.0	0 / 5	--	--	100	-- / --	0.15	No	Not detected
Aroclor-1262	14.0 - 15.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected

TABLE 8

AOC-C Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Aroclor-1268	14.0 - 15.0	0 / 5	--	--	NSV	-- / --	NSV	No	Not detected
Inorganics (MG/KG)									
Aluminum	-- - --	5 / 5	13,000	CBD-AOC-SS05-1012	NSV	5 / 5	NSV	**Yes**	No screening value
Antimony	-- - --	5 / 5	0.23	CBD-AOC-SS01-1012	78.0	0 / 5	0.0029	No	HQ less than one
Arsenic	-- - --	5 / 5	3.60	CBD-AOC-SS05-1012	18.0	0 / 5	0.20	No	HQ less than one
Barium	-- - --	5 / 5	55.0	CBD-AOC-SS05-1012	330	0 / 5	0.17	No	HQ less than one
Beryllium	-- - --	5 / 5	0.44	CBD-AOC-SS01-1012	40.0	0 / 5	0.011	No	HQ less than one
Cadmium	-- - --	5 / 5	0.087	CBD-AOC-SS01-1012	32.0	0 / 5	0.0027	No	HQ less than one
Calcium [2]	-- - --	5 / 5	340	CBD-AOC-SS02-1012	NSV	-- / --	NSV	No	Macronutrient
Chromium (hexavalent)	0.22 - 0.22	0 / 1	--	--	0.40	-- / --	0.55	No	Not detected
Chromium	-- - --	5 / 5	14.0	CBD-AOC-SS05-1012	0.0075	5 / 5	1,867	**Yes**	HQ greater than one
Cobalt	-- - --	5 / 5	4.00	CBD-AOC-SS05-1012	13.0	0 / 5	0.31	No	HQ less than one
Copper	-- - --	5 / 5	3.60	CBD-AOC-SS05-1012	70.0	0 / 5	0.051	No	HQ less than one
Cyanide	0.053 - 0.055	2 / 5	0.054	CBD-AOC-SS01-1012	0.0050	2 / 5	10.8	**Yes**	HQ greater than one
Iron	-- - --	5 / 5	15,000	CBD-AOC-SS05-1012	NSV	-- / --	NSV	**Yes**	No screening value
Lead	-- - --	5 / 5	20.0	CBD-AOC-SS01-1012	120	0 / 5	0.17	No	HQ less than one
Magnesium [2]	-- - --	5 / 5	1,300	CBD-AOC-SS05-1012	NSV	-- / --	NSV	No	Macronutrient
Manganese	-- - --	5 / 5	130	CBD-AOC-SS01-1012	220	0 / 5	0.59	No	HQ less than one
Mercury	-- - --	5 / 5	0.019	CBD-AOC-SS01-1012	0.058	0 / 5	0.33	No	HQ less than one
Nickel	-- - --	5 / 5	6.80	CBD-AOC-SS05-1012	38.0	0 / 5	0.18	No	HQ less than one
Potassium [2]	-- - --	5 / 5	650	CBD-AOC-SS05-1012	NSV	-- / --	NSV	No	Macronutrient
Selenium	0.16 - 0.30	3 / 5	0.37	CBD-AOC-SS01-1012	0.52	0 / 5	0.71	No	HQ less than one
Silver	-- - --	5 / 5	0.044	CBD-AOC-SS01-1012	560	0 / 5	7.86E-05	No	HQ less than one
Sodium [2]	7.10 - 17.0	0 / 5	--	--	NSV	-- / --	NSV	No	Macronutrient
Thallium	-- - --	5 / 5	0.16	CBD-AOC-SS05-1012	0.0010	5 / 5	160	**Yes**	HQ greater than one
Vanadium	-- - --	5 / 5	24.0	CBD-AOC-SS05-1012	0.50	5 / 5	48.0	**Yes**	HQ greater than one
Zinc	18.0 - 26.0	2 / 5	24.0	CBD-AOC-SS01-1012	120	0 / 5	0.20	No	HQ less than one
Other Parameters (various units)									
pH (PH)	-- - --	5 / 5	5.40	CBD-AOC-SS04-1012	NSV	-- / --	NSV	--	--
Total organic carbon (TOC) (MG/KG)	-- - --	5 / 5	11,000	CBD-AOC-SS02-1012	NSV	-- / --	NSV	--	--

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

2 - Macronutrient - Not considered to be a COPC

COPC - Contaminant of Potential Concern

HQ - Hazard Quotient

MG/KG - Milligrams per kilogram

NSV - No Screening Value

PH - pH units

UG/KG - Micrograms per kilogram

TABLE 9

AOC-D Surface Soil Screen

Site Investigation Report

NRL-CBD, Chesapeake Beach, Maryland

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Retain?	Rationale
Inorganics (MG/KG)										
Lead	-- - --	4 / 4	1,200	3,000	CBD-AOD-SS02-1012	120	4 / 4	25.0	**Yes**	HQ greater than one

NOTES

1 - Count of detected samples exceeding or equaling Screening Value

HQ - Hazard Quotient

MG/KG - Milligrams per kilogram

NSV - No Screening Value

TABLE 10

Comparison of Maximum Detected COPC Concentrations to Anticipated Typical Concentrations for Eastern Maryland

Site Investigation Report

NRL-CBD, Chesapeake Beach , Maryland

	Background Soil Group 2					Background Soil Group 3				
Constituent	Background value[1]	Site 2	Site 4	Site 5	AOC C	Background value[1]	Site 3	Site 7	Site 9	AOC D
		Maximum Concentration Detected					Maximum Concentration Detected			
Aluminum	16,800	12,000	15,000	7,400	13,000	9,340	7,900	6,600	4,700	--
Antimony	--	0.25	2.10	2.40	0.23	--	0.90	0.40	0.88	--
Arsenic	9.95	5.1	5.20	5.10	3.60	6.24	**14.0**	3.50	2.70	--
Barium	67.0	30	43.0	39.0	55.0	105.0	44.0	33.0	22.0	--
Beryllium	0.76	0.36	0.58	**1.40**	0.44	1.04	0.64	0.45	0.30	--
Cadmium	1.57	0.044	0.29	0.44	0.087	1.09	0.17	0.52	0.29	--
Calcium [2]	3,030	420	750	2,500	340	3,560	**4,100**	**16,000**	**7,900**	--
Chromium (hexavalent)	--	2.25	0.35	0.17	--	--	0.15	0.30	1.05	--
Chromium	42.0	15.0	20.0	18.0	14.0	27.3	12.0	21.0	18.0	--
Cobalt	4.8	2.90	4.00	**6.90**	4.00	5.4	3.40	2.60	2.10	--
Copper	21.3	5.5	14.0	**230**	3.60	43.6	3.90	9.90	13.0	--
Cyanide	--	--	0.026	0.065	0.054	--	0.043	0.32	--	--
Iron	71,300	17,000	21,000	14,000	15,000	17,300	8,400	15,000	13,000	--
Lead	61.8	8.9	59.0	**140**	20.0	95.8	11.0	64.0	28.0	**1,200**
Magnesium [2]	1,210	820	**1,400**	**1,300**	**1,300**	1,830	1,400	**4,300**	1,800	--
Manganese	331	55.0	120	100	130	208	160	130	61.0	--
Mercury	0.11	0.021	0.084	0.11	0.019	0.99	0.012	0.047	0.047	--
Nickel	10.1	8.20	7.70	**15.0**	6.80	15.1	10.0	**19.0**	9.00	--
Potassium [2]	1,280	660	930	1,000	650	986	400	**1,000**	670	--
Selenium	2.41	0.42	0.41	0.47	0.37	2.76	0.96	0.34	0.50	--
Silver	0.14	0.054	**0.94**	**0.68**	0.044	8.70	0.034	0.065	3.90	--
Sodium [2]	--	--	--	22.0	--	--	200	110	--	--
Thallium	0.33	0.16	0.27	0.13	0.16	0.44	0.24	0.20	0.15	--
Vanadium	42.8	29.0	31.0	40.0	24.0	26.1	18.0	**78.0**	17.0	--
Zinc	65.6	22.0	**66.0**	5.90	24.0	142.0	45.0	**260**	47.0	--

NOTES

1 - 95% UTLs generated under the Munitions Response program at NRL-CBD (Tetra Tech, 2015)

2 - Macronutrient - Not considered to be a COPC

"--" indicates that there is no background value available or constituent was undetected

All concentrations in milligrams per kilogram (MG/KG)

Bold/underlined concentrations exceed soil group-specific background value

Shading indicates COPC concentrtions that also exceed soil group-specific background value