Final

Remedial Investigation Report, Site 24

Naval Weapons Station Yorktown
Yorktown, Virginia

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Executive Summary

This report presents the Remedial Investigation (RI) at Site 24, Naval Weapons Station (WPNSTA) Yorktown, in Yorktown, Virginia. Based on the results from previous investigations, the RI was conducted to characterize the nature and extent of buried debris and the potential contamination of soil and groundwater and to assess the potential risks posed by exposure to contamination by human and ecological receptors.

Test pitting activities indicate that the extent of buried debris has been delineated and is limited to six small (each less than 2,000 square feet [ft^2]) discontinuous disposal areas (Disposal Areas B [north and south], C, E, and F [north and south]). Waste debris consists of miscellaneous metal debris, metal banding material, inert ordnance debris, and three empty and rusted 55-gallon drums. No ash was observed within any of the test pits.

For the purposes of site management, potential risks were evaluated with respect to waste and contaminated soil within the six disposal areas and soil and groundwater outside the six disposal areas. The only potential unacceptable human health risks at Site 24 are associated with non-carcinogenic hazards to the possible future child and carcinogenic risks to the lifetime resident from exposure to waste and soil within the waste disposal areas (primarily Aroclor-1254, aluminum, cadmium, chromium, and copper), soil across the entire site (primarily Aroclor-1254, arsenic, and chromium), and soil outside the waste area (primarily arsenic and chromium). Although cancer risks to the future lifetime resident (child + adult), assuming all detected chromium is hexavalent chromium, in combined surface and subsurface soil across the site ($2x10^{-4}$), within the waste disposal areas ($3x10^{-4}$), and outside the waste disposal areas ($2x10^{-4}$), slightly exceed the United States Environmental Protection Agency (USEPA) acceptable risk range ($1x10^{-4}$), site analytical data reflect total chromium. It is reasonable to assume that most (if not all) of the total chromium is trivalent then the lifetime resident cancer risk for combined surface and subsurface soil across the site, within the waste disposal areas, and outside the waste disposal areas are within the USEPA acceptable risk range ($7x10^{-5}$, $8x10^{-5}$, $7x10^{-5}$and respectively). Additionally, chromium concentrations in soil at Site 24 are consistent with base background concentrations for soils. Surface water and sediment are not associated with Site 24.

The Ecological Risk Assessment (ERA) concluded that, for terrestrial habitats, risks for lower trophic level receptors (plants and invertebrates) are generally acceptable on a site-wide basis, particularly given the current and future land use of the areas (training facility). However, a few small, isolated areas with high concentrations of mercury (area of sample A06SS-11) and arsenic (areas of samples YS24-SS31 and YS24-SS04) in surface soil were identified. In these areas, spatially-limited, localized risks to some lower trophic level receptors may exist. No chemical had a Maximum Acceptable Toxicant Concentration (MATC) hazard quotient (HQ) exceeding 1 based upon the 95 percent upper confidence limit (UCL) exposure dose. Thus, risks from terrestrial food web exposures are acceptable. In addition, it was determined that groundwater is not a significant transport medium for site-related constituents to the York River, Felgates Creek, or Indian Field Creek.

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Acronyms and Abbreviations

°C	degree Celsius
°F	degree Fahrenheit
µg/kg	microgram per kilogram
µg/L	microgram per liter
µm	micrometer
ADAF	age-dependent adjustment factor
amsl	above mean sea level
atm-m^3/M	atmosphere per cubic meter per mole
AUF	Area Use Factor
AWQC	Ambient Water Quality Criteria
BAF	bioaccumulation factor
BCF	bioconcentration factor
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BHC	benzene hexachloride
BTAG	Biological Technical Assistance Group
Cal EPA	California Environmental Protection Agency
CEC	cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action—Navy
CN^-	cyanide ion
COC	constituent of concern
COI	constituent of interest
COPC	constituent of potential concern
CR	carcinogenic risk
CSF	cancer slope factor
CSM	conceptual site model
CTE	central tendency exposure
CTO	Contract Task Order
DABS	dermal absorption factor
DDD	dichlorodiphenyldichloroethane
DDT	dichlorodiphenyltrichloroethane
DI	deionized
DNT	dinitrotoluene
DO	dissolved oxygen
DQO	data quality objective
EC_{50}	Effective Concentration to 50 percent of the population
Eco-SSL	ecological soil screening level
E_h	oxidation potential
ELCR	excess lifetime carcinogenic risk
EM	electromagnetic
EPC	exposure point concentration
ER	Environmental Restoration
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program

ESQD	Explosive Safety Quantity Distance
ESV	ecological screening value
FFA	Federal Facilities Agreement
f_{oc}	fraction of organic carbon
FS	Feasibility Study
ft^2	square foot
ft/day	foot per day
g/cm^3	gram per cubic centimeter
GI	gastrointestinal
GPS	Global Positioning System
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
HSA	hollow-stem auger
IAS	Initial Assessment Study
ID	inside diameter
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IRIS	Integrated Risk Information System
IUR	inhalation unit risk factor
JIEDDO	Joint Improvised Explosive Device Defeat Organization
K_d	distribution coefficient
K_h	horizontal hydraulic conductivity or Henry's Law Constant
K_{oc}	organic carbon partition coefficient
K_{ow}	octanol-water partition coefficient
L/day	liter per day
LC_{50}	lethal concentration to 50 percent of the population
LOAEL	Lowest Observed Adverse Effect Level
MATC	Maximum Acceptable Toxicant Concentration
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/kg-BW/day	milligram per kilogram body weight per day
ml/g	milliliter per gram
mg/L	milligram per liter
MMOA	mutagenic mode of action
MS	matrix spike
mS/cm	milliSiemen per centimeter
MSD	matrix spike duplicate
mV	millivolt
NACIP	Navy Assessment and Control of Installation Pollutants
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCEA	National Center for Environmental Assessment
NJ EPA	New Jersey Environmental Protection Agency
NPL	National Priorities List
NOAEL	No Observed Adverse Effect Level
NTU	nephelometric turbidity unit

ORP	oxidation-reduction potential
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEF	particulate emission factor
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
PPRTV	Provisional Peer Reviewed Toxicity Value
ppt	parts per thousand
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RfC	inhalation reference concentration
RfD	reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SERA	Screening-level Ecological Risk Assessment
SMDP	Scientific Management Decision Point
SQL	sample quantitation (reporting) limit
SSA	Site Screening Area
SSP	Site Screening Process
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TAL	target analyte list
TCL	target compound list
TCLP	Toxicity Characteristic Leachate Procedure
TNT	trinitrotoluene
TOC	total organic carbon
TRV	Toxicity Reference Value
UCL	upper confidence limit
UF	uncertainty factor
UFP	Uniform Federal Policy
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit
VDEQ	Virginia Department of Environmental Quality
VF	volatilization factor
VOC	volatile organic compound
WPNSTA	Naval Weapons Station

SECTION 1

Introduction

This Remedial Investigation (RI) Report presents the data and findings obtained from field investigation activities conducted to characterize the nature and extent of contamination and to assess potential risks to human health and the environment at Naval Environmental Restoration Program (ERP) Site 24, Naval Weapons Station (WPNSTA) Yorktown, Yorktown, Virginia. This report was prepared under the Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Division, Comprehensive Long-term Environmental Action—Navy (CLEAN) 1000, Contract N62470-08-D-1000, Contract Task Order (CTO) WE19, for submittal to NAVFAC, United States Environmental Protection Agency (USEPA) Region III, and Virginia Department of Environmental Quality (VDEQ). The Navy, USEPA, and VDEQ work jointly as the WPNSTA Yorktown Tier I Partnering Team.

RI field activities discussed in this report were conducted between April and June 2010 and in May, July, and September 2013 to fill data gaps and to further characterize the nature and extent of contamination and support an assessment of potential environmental and human health risks associated with exposure to site media at Site 24. The 2010 field activities were conducted in accordance with the Uniform Federal Policy (UFP) – Sampling and Analysis Plan (SAP) titled *Site 24 Remedial Investigation Work Plan, Naval Weapons Station Yorktown, Yorktown, Virginia* (Site 24 SAP) (CH2M HILL, 2010). The 2013 field activities were conducted in accordance with the March 4, 2013 Response to Comment document which outlined responses to the EPA's fourth round of comments on the draft version of this RI document.

1.1 Objectives and Approach

The objectives of the RI are to characterize the nature and extent of potential contamination in groundwater and soil and to assess the potential risks posed by this contamination to human health and the environment. No perennial surface water is present at the site. Surface water is only present in drainage ditches during and immediately following precipitation events. Similarly, there is no sediment associated with Site 24. Therefore, there is no Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) release to these media, and they are not included in this RI.

The activities completed to support the objectives of the RI activities were as follows:

- Collection of soil samples to investigate surface drainage areas immediately downgradient of where elevated levels of polychlorinated biphenyls (PCBs) and cadmium were previously detected
- Excavation of test pits to determine the lateral and vertical extent of buried materials in disposal areas at the site
- Collection of soil samples from within the disposal areas, outside the disposal areas, and within the drainage areas
- Installation of nine shallow and two deep monitoring wells
- Completion of a groundwater-level survey and collection of groundwater samples from all new and existing monitoring wells
- Completion of hydraulic conductivity testing
- Quantitative assessment of the potential human health and ecological risks associated with exposure to contaminated site media, where identified

1.2 Site Background

This subsection provides a general summary of WPNSTA Yorktown and Site 24, including site descriptions and environmental history.

1.2.1 Naval Weapons Station Yorktown

WPNSTA Yorktown is a 10,624-acre installation located on the Virginia Peninsula in York and James City Counties and the City of Newport News, Virginia (**Figure 1-1**). WPNSTA Yorktown is bounded on the northwest by WPNSTA Yorktown Cheatham Annex and the King's Creek Commerce Center; on the northeast by the York River and the Colonial National Historic Parkway; on the southwest by Route 143 and Interstate 64; and on the southeast by Route 238 and the town of Lackey.

Originally named the United States Mine Depot, WPNSTA Yorktown was established in 1918 to support the laying of mines in the North Sea during World War I. For 20 years after World War I, the depot continued to receive, reclaim, store, and issue mines, depth charges, and related materials. During World War II, the facility was expanded to include three trinitrotoluene (TNT) loading plants and new torpedo overhaul facilities. A research and development laboratory for experimentation with high explosives was established in 1944. In 1947, a quality evaluation laboratory was developed to monitor special tasks assigned to the facility, which included the design and development of depth charges and advanced underwater weapons. On August 7, 1959, the depot was renamed the United States WPNSTA. Today, the primary mission of WPNSTA Yorktown is to provide ordnance, technical support, and related services to sustain the war-fighting capability of the armed forces in support of national military strategy.

Comprehensive Environmental Restoration (ER) activities at WPNSTA Yorktown began in 1984 under the Navy Assessment and Control of Installation Pollutants (NACIP) and ERP. On October 15, 1992, WPNSTA Yorktown was added to the National Priorities List (NPL), which required all subsequent ER activities to be conducted under CERCLA. The Navy and USEPA executed a Federal Facilities Agreement (FFA) in August 1994, which incorporated the Resource Conservation and Recovery Act (RCRA) Solid Waste Management Units (SWMUs) and identified 16 sites.

1.2.2 Site 24

Site 24, the Aviation Field, includes approximately 14 acres of an open, grassy field surrounding the helicopter landing-pad in the northern portion of WPNSTA Yorktown, just south of the York River (**Figure 1-2**). The site is bounded by the WPNSTA Yorktown installation fence line to the north, former railroad tracks to the east and Main Road to the south. A Joint Improvised Explosive Device Defeat Organization (JIEDDO) battle course (formerly storage areas) is located in the western portion of the site and along the western perimeter of the site (**Figure 1-3**). The Site 24 boundary is consistent with the Site Screening Area (SSA) 6 Helicopter Landing Pad Area, as identified in the Site Screening Process (SSP) Report (Baker, 1996). Existing structures at Site 24 include a concrete helicopter landing-pad and several gravel roads that connect to the JIEDDO battle course. Railroad tracks that were once present onsite have been removed; however, the stone beds used as the foundation for the tracks remain. A bioremediation cell (**Figure 1-2**), constructed on the northern side of the site in 1999 to treat contaminated soil and sediment from nearby Site 6, was removed from Site 24 in December 2006 once treatment of the media was completed (Shaw, 2008).

Site 24 was historically utilized as an aviation field until 1927. After World War I, the site was reportedly used for storage of munitions, both on the surface and in underground caches, until they were recovered and used during World War II. Site 24 was also used for the storage and burial of miscellaneous materials, including munitions debris, rocket motor casings, batteries, cables, parachutes, and metal and construction debris until the mid-1980s. Burning of explosives-contaminated waste and other base waste may also have occurred at the site. The primary source of contamination at Site 24 is associated with the disposal/burial areas (Areas B, C, E and F [**Figure 1-4**]). Impacts to site media could also be associated with a small area with black sludge-like material of unknown origin on the ground surface (Area D).

A review of historical photographs conducted during development of the Site 24 SAP confirmed existing knowledge of past site activities (CH2M HILL, 2010). An undated photograph (**Appendix A**) provided by the USEPA appears to be the earliest picture based on the presence of airplane hangars that are absent in a photograph taken in 1945. The picture shows the northeast portion of the site and contains a number of unknown structures with an aerial sign that reads "TNT DANGER." While it is not known what these structures are or what they were

used for, it is speculated that they are above ground TNT caches, as indicated by the aerial sign. In addition, due to uncertainties surrounding this photograph (date, photographer's location, etc.) it is not possible to identify the locations of the structures except to indicate that they are located in the northeast corner of the site. By 1945, these structures had been removed. No significant changes were observed in a photograph taken in 1951, while the 1963 photograph revealed a variety of storage containers were present throughout the northern portion of the site. Land disturbance was also noted in the vicinity of the present-day helicopter pad. Increased storage and land disturbance was observed in a photograph from 1968. A 1972 photograph depicts a reduction in storage corresponding with an increase in land disturbance within the site area. By the time a photograph was taken in 1981, the storage containers had been restricted to the western storage area (outside of the Site 24 boundary), and the area where land disturbance was observed had been restored. In addition, the helicopter landing-pad had been constructed. Other than increased vegetation, no significant environmental changes were observed between the 1981 and 1993 photographs.

1.3 Summary of Previous Investigations

This section presents a summary of the results and findings from previous investigations conducted prior to the 2010 field investigation activities that are the subject of this RI. **Figure 1-5** presents historical study areas and locations of samples collected prior to the 2010 RI field activities.

1.3.1 Initial Assessment Study (1984)

The Initial Assessment Study (IAS) at WPNSTA Yorktown was documented in the report titled *Initial Assessment Study of Naval Weapons Station Yorktown, Virginia* (C.C. Johnson & Associates, Inc. and CH2M HILL, 1984). The IAS was conducted to identify and assess sites posing a potential threat to human health and the environment due to contamination from prior waste management activities, which included the Aviation Field (identified as Site 14 in the IAS, a portion of which is included within the Site 24 study area). Activity records relating to waste generation, handling, and disposal were reviewed, physical conditions at the site were characterized, and migration pathways and potential receptors were identified. The IAS concluded that the burning of explosives, and possibly base waste, may have occurred in the vicinity of the current helicopter landing-pad area for a very short time in the 1930s, and that no known or suspected hazardous wastes were present at the site.

1.3.2 Site Screening Process (Baker, 1996)

Following completion of the IAS, the Aviation Field (Site 14) was renamed SSA 6. An SSP was conducted at SSA 6 to determine if conditions at SSA 6, among other SSAs, warranted initiation of the RI/Feasibility Study (FS) process. SSA 6 consisted of the SSA 6 Storage Area, the SSA 6 Sludge Disposal Area, and the SSA 6 Helicopter Landing Pad Area (currently Site 24). Results from two surface soil samples collected in 1990, north of Buildings 407 and 408 (within the former Site 14 study area), a 1994 geophysical survey, and 1994 SSP sampling activities (**Figure 1-5**) were included in the SSP and are discussed as follows.

1.3.2.1 1990 Surface Soil Samples

Two surface soil samples (Samples A and B) were collected from the SSA 6 Storage Area, north of Buildings 407 and 408. The two samples were analyzed for mercury and PCBs. Mercury was not detected in either surface soil sample. Aroclor-1254 was detected at concentrations of 4.4 milligrams per kilogram (mg/kg) and 2.1 mg/kg, which exceeded the 1993 USEPA risk-based concentration of 0.74 mg/kg; however, additional RI efforts in this area were not recommended.

1.3.2.2 1994 Surface Geophysical Survey

In 1994, a geophysical survey was conducted to identify areas of buried debris and fill material (**Figure 1-4**). Utilizing electromagnetic terrain conductivity, magnetometry, and ground penetrating radar techniques, four major disposal areas (Areas B, C, E, and F), one minor disposal area (Area G), and one area of black sludge-like material (Area D) were identified within the SSA 6 Helicopter Landing Pad Area (currently Site 24). The geophysical survey did not include the SSA 6 Storage Area, because of interference caused by surface metal (debris piles and buildings), or the SSA 6 Sludge Disposal Area (Area A), because of heavy vegetative growth.

1.3.2.3 1994 SSP Field Activities

As part of the 1994 SSP field activities, nine test pits were excavated and 28 surface soil samples, 54 subsurface soil samples, and 10 hydropunch groundwater samples were collected from SSA 6 (**Figure 1-5**).

Test pits were excavated in each of the disposal areas identified during the surface geophysical survey (Areas B, C, E, F, and G), as well as in two additional areas identified as possible burial areas by WNPSTA Yorktown employees (Areas H and I). Buried materials, including metal banding, pipes, metal grating, wire, and inert ordnance components (activating devices and rocket motor casings), were identified between 2 and 13 feet below ground surface (bgs) within the Helicopter Landing Pad Area (Areas B, C, E, and F). Metal banding and strapping were identified between the ground surface and 1.5 feet bgs within the SSA 6 Storage Area (Area H). No buried debris was identified within Areas G and I.

Analytical results indicated the presence of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, PCBs, and inorganic constituents in soil (surface and subsurface) and groundwater samples. In general, however, identified risks were due to exposure to soil and groundwater within the SSA 6 Helicopter Pad Landing Area. As a result, further RI/FS efforts were recommended for the SSA 6 Helicopter Pad Landing Area. The SSA 6 Helicopter Pad Landing Area is now referred to as Site 24. In addition, no further action, including additional RI/FS efforts were recommended and subsequently approved by the USEPA and VDEQ for the SSA 6 Sludge Disposal Area and the SSA 6 Storage Area; therefore, no additional investigation activities were conducted at these sites and they are not discussed in this RI Report.

1.3.3 Draft Round One Remedial Investigation (Final version never submitted)

The Round One RI at Site 24, conducted in September 1997, consisted of a surface soil investigation to obtain information to be used in baseline Human Health Risk Assessments (HHRAs) and Ecological Risk Assessments (ERAs) and to further evaluate the nature of surface soil contamination at the site. The efforts from this investigation were documented in the *Draft Final Remedial Investigation Report for Sites 23, 24, 25, and* 26 (Draft Final RI Report) (Baker, 2002). Five surface soil samples were collected from Site 24 during this investigation (**Figure 1-5**). Sample locations were located just south and east of the test pits from which the soil samples with high concentrations of PCBs and cadmium were collected during the SSP investigation (TP02 and TP03). These data and the data collected during the SSP were used to conduct HHRAs and ERAs; however, during the August 2007 WPNSTA Yorktown Partnering Meeting, the Navy decided that the efforts conducted during the Round One RI were insufficient to adequately characterize the nature and extent of contamination and risks at Site 24. Consequently, the team recommended the removal of Site 24 from the Round One RI report and the collection of additional soil and groundwater data. These data are included in this RI Report.

1.4 Report Organization

The RI Report is organized as follows:

- **Section 1** – Introduction
- **Section 2** – Field Investigation Methods
- **Section 3** – Physical Characteristics
- **Section 4** – Nature and Extent of Contamination
- **Section 5** – Chemical Fate and Transport
- **Section 6** – Human Health Risk Assessment
- **Section 7** – Ecological Risk Assessment
- **Section 8** – Conclusions and Recommendations
- **Section 9** - References

Tables and figures are provided at the end of each respective section. Appendixes are included at the end of the report.

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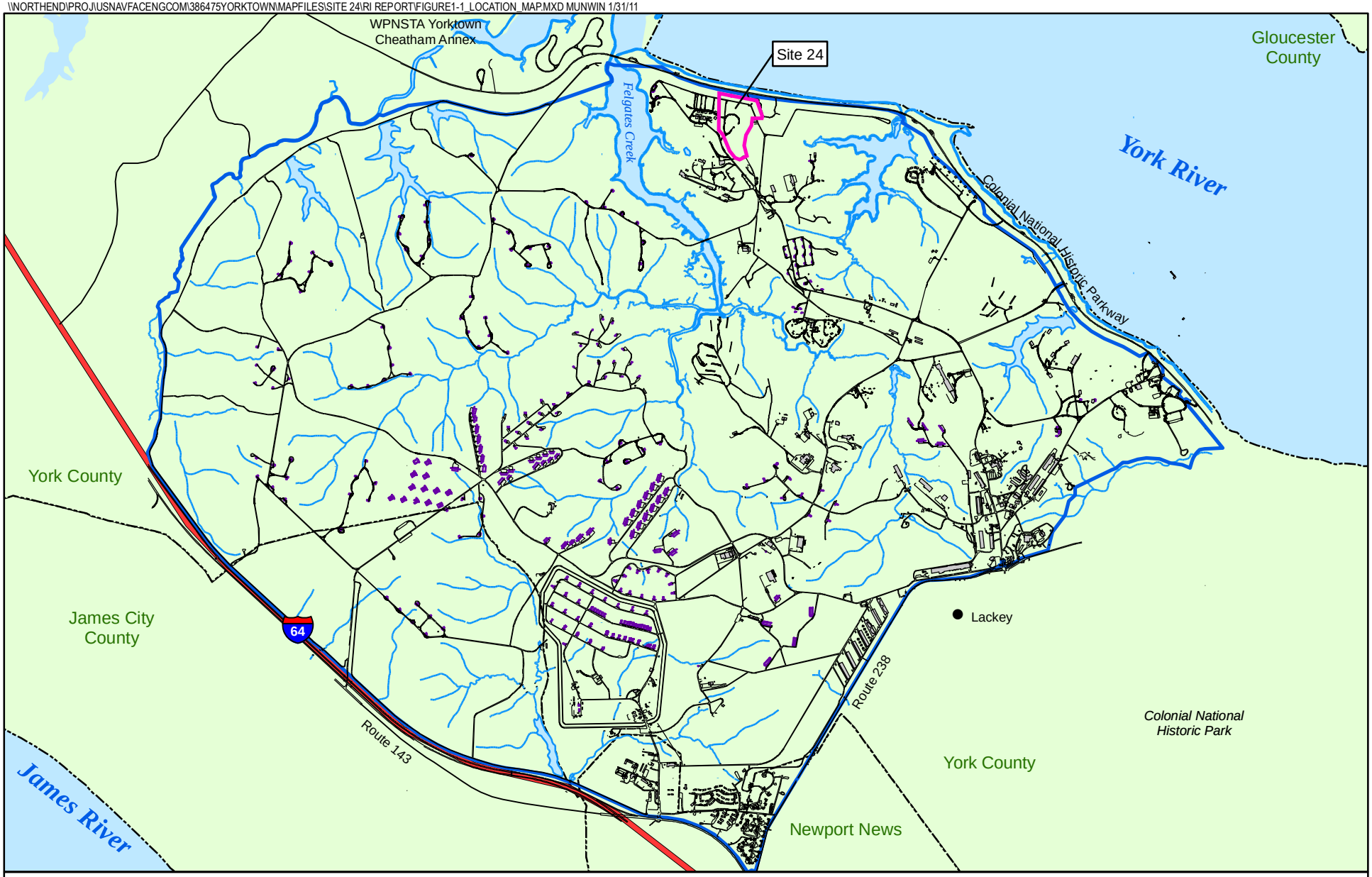

Legend

- Estimated Site Boundaries
- Buildings and Structures
- Yorktown Naval Weapons Station Base Boundary
- Interstate 64
- Magazines
- County Lines

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Figure 1-1
WPNSTA Yorktown Base Location Map
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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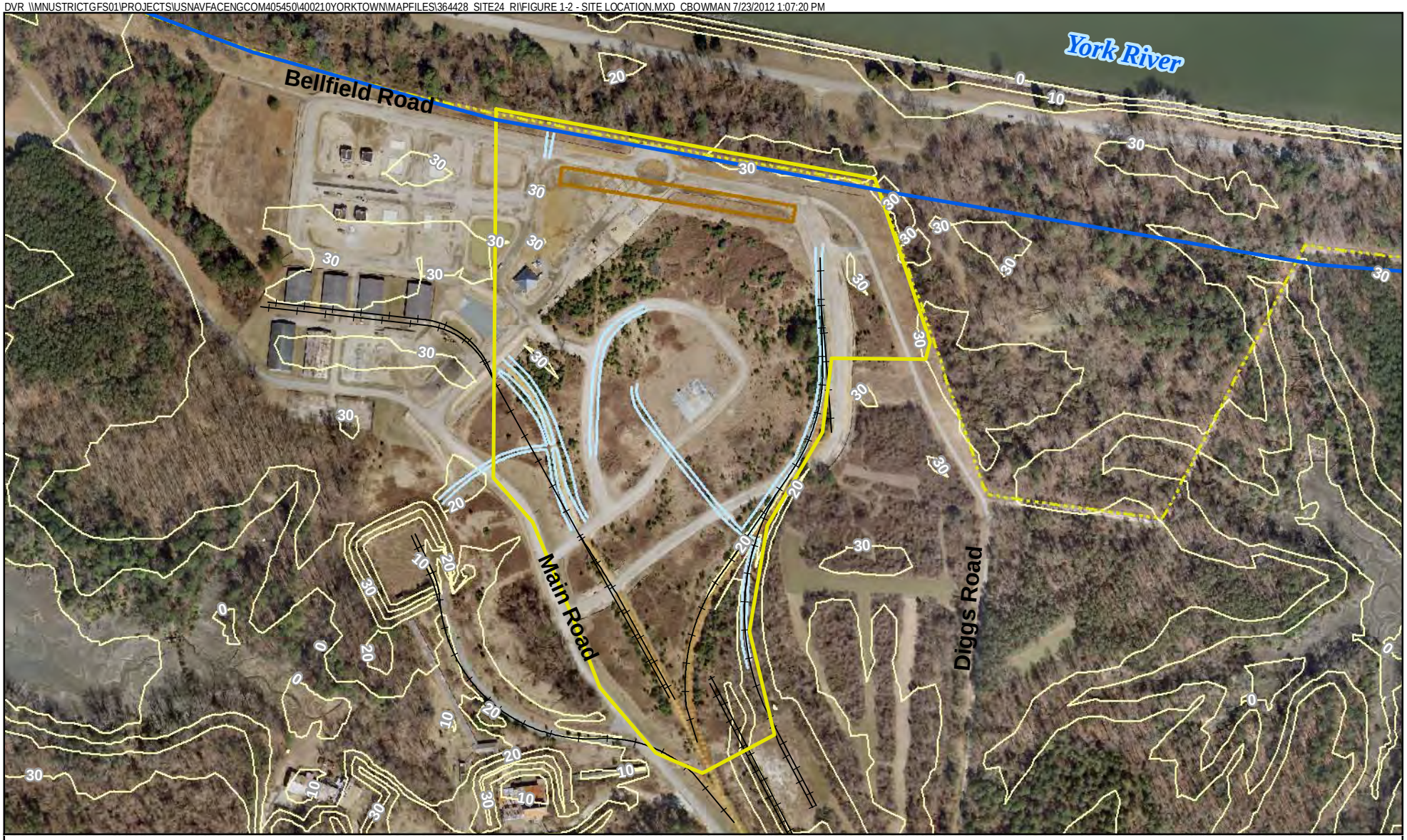
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 1-2 - SITE LOCATION.MXD CBOWMAN 7/23/2012 1:07:20 PM



Legend

- Fences
- Former Railroad Tracks
- Elevation Contour (10 ft interval)
- Drainage Swales
- Yorktown Base Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Former Site 6 Bioremediation Treatment Cell Location (removed in 2006)

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Figure 1-2
Site 24 Site Location Map
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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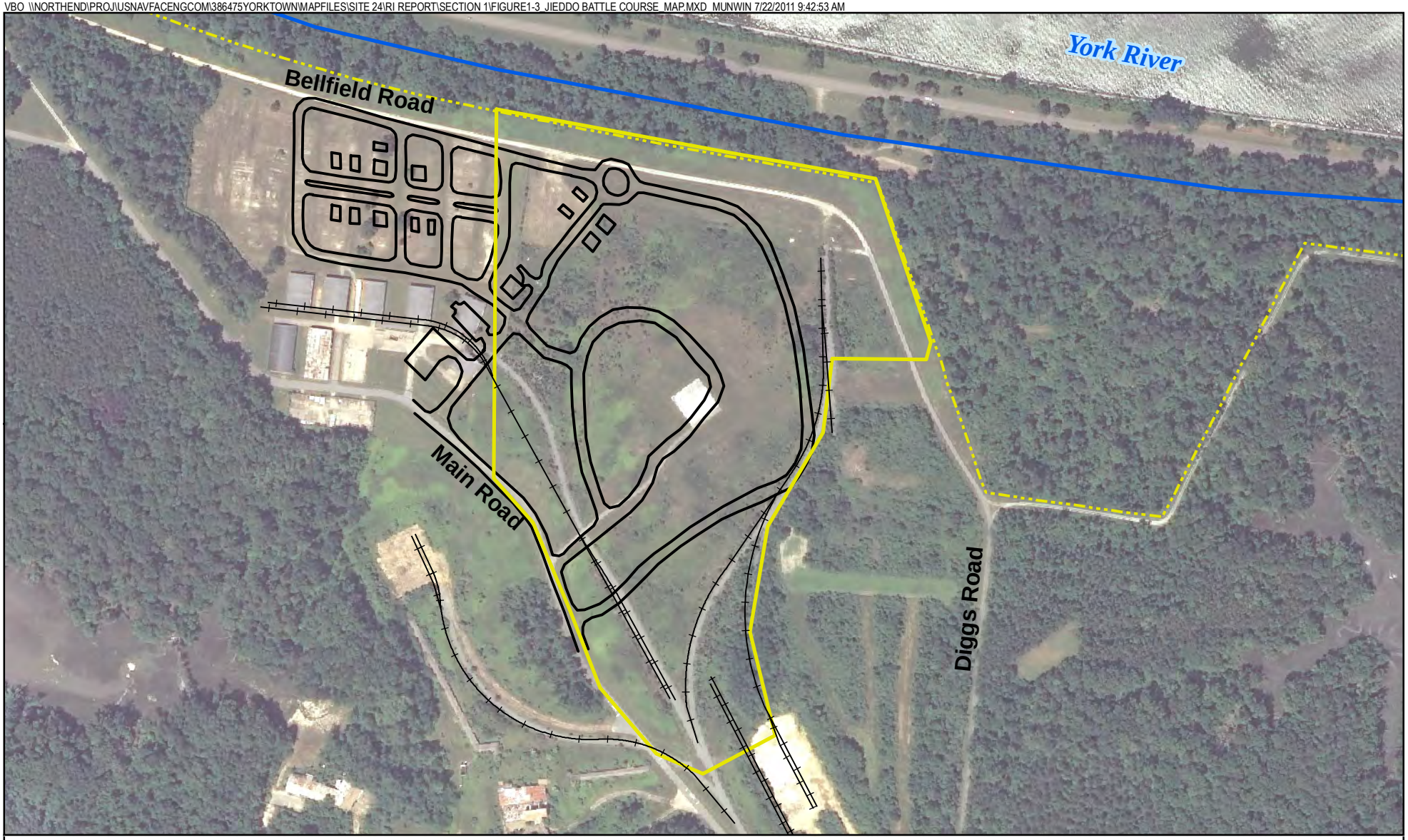
VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 1\FIGURE1-3_JIEDDO BATTLE COURSE_MAP.MXD MUNWIN 7/22/2011 9:42:53 AM



Legend

- JIEDDO Battle Course
- Fences
- Former Railroad Tracks
- Yorktown Base Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)

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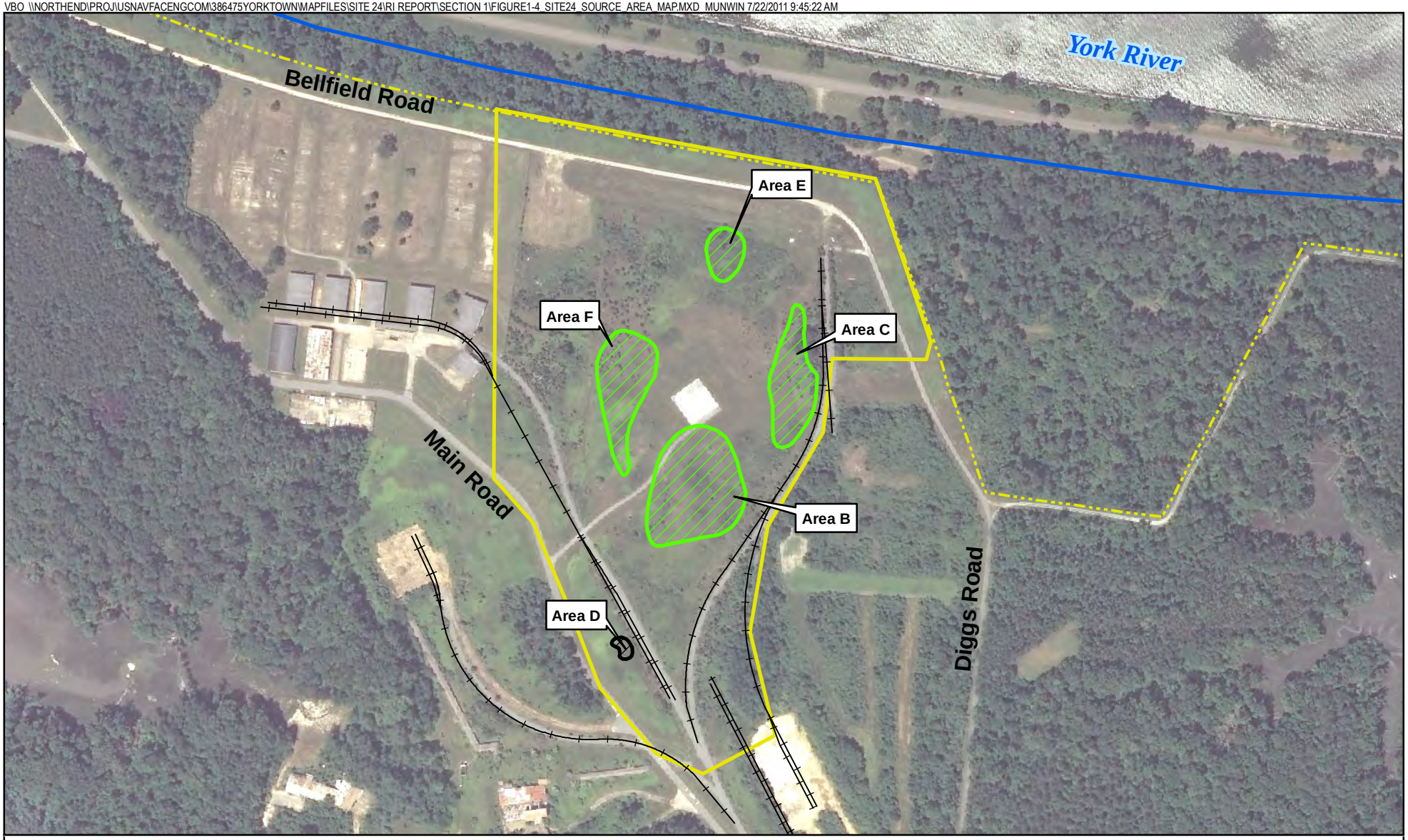
Figure 1-3
JIEDDO Battle Course Map
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 1\FIGURE1-4_SITE24_SOURCE_AREA_MAP.MXD MUNWIN 7/22/2011 9:45:22 AM



Legend

- Fences
- Former Railroad Tracks
- Yorktown Base Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Magnetic Anomalies
- Black Sludge Material

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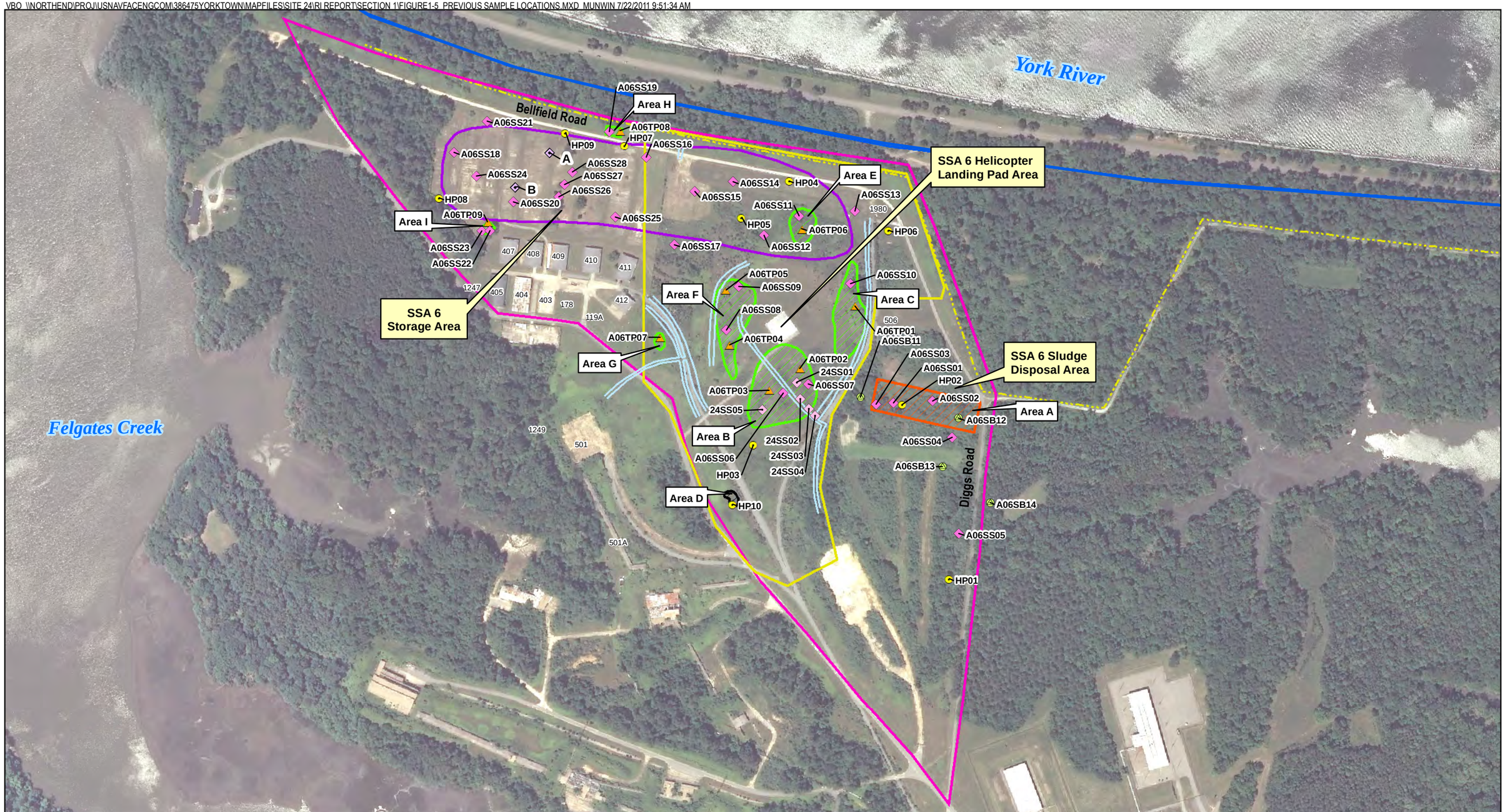
Figure 1-4
Site 24 Source Area Map
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 1\FIGURE1-5_PREVIOUS SAMPLE LOCATIONS.MXD MUNWIN 7/22/2011 9:51:34 AM



Legend

- Yorktown Base Boundary
- Magnetic Anomalies (SSP, 1994)
- Black Sludge-like Material (SSP, 1996)
- SSA 6 Sludge Disposal Area (SSP, 1996)
- SSA 6 Boundary
- Site 14 Boundary (IAS, 1984)
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Fences
- Drainage Swales
- Test Pit Locations (SSP, 1996)
- Soil Boring/Temporary Monitoring Well Locations (SSP, 1996)
- Soil Boring (SSP, 1996)
- Surface Soil Sample Location (1990)
- Surface Soil Sample Location (SSP, 1996)
- Surface Soil Sample Location (1997)

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Figure 1-5
Previous Investigation Sample Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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SECTION 2

Field Investigation Methods

This section describes the approach and methodology for the field investigation activities conducted as part of the RI at Site 24 (1997, 2010, and 2013 field events). A detailed description of the approach and methodology for the field investigation activities conducted as part of the SSP at Site 24 are included in the *Site Screening Process Report for Site Screening Areas 1, 6, 7, 15* (Baker, 1996). Field activities conducted in 1997 by Baker included surface soil sampling within one disposal area (Area B), outside the disposal areas, and within drainage areas. Field activities conducted in 2010 and 2013 by CH2M HILL included buried debris delineation through test pitting, surface and subsurface soil sampling, including waste, below waste, and drainage area sampling, monitoring well installation, groundwater monitoring and sampling, and slug testing. Specific details of the sampling rationale and objectives for the 1997 field activities are provided in the *Work Plan for Sites 23, 24, 25, and 26 and Site Screening Areas (SSAs) 3, 4, 5, 9, 10, 10, 20, 21, 22, 23, and 24 Round One Remedial Investigation* (1997 Work Plan) (Baker, 1997). Specific details of the sampling rationale and objectives for the 2010 field activities are provided in the Site 24 SAP (CH2M HILL, 2010). Specific details of the sampling rationale and objectives for the 2013 field activities are provided in the March 4, 2013 Response to Comment document which outlined responses to the EPA's fourth round of comments on the draft version of this RI document (Attachment 1).

Table 2-1 summarizes the environmental data used to characterize the nature and extent of contamination, including the number of samples collected, sample nomenclature, the media sampled, the sample collection method, and the analyses performed. **Figures 2-1 through 2-5** present the locations of the samples collected during the RI in the various environmental media.

The investigation activities were implemented to support:

- Development of the hydrogeologic conceptual model of Site 24 (**Section 4**)
- Assessment of the nature, extent, fate, and transport of contamination, potential sources of contamination, and development of a contaminant conceptual site model (CSM) (**Sections 4 and 5**)
- Assessment of potential risks to human health and the environment (**Sections 6 and 7**)
- Information required for the development of a future FS (**Section 8**)

2.1 Pre-Investigation Activities

Prior to the 2010 RI field investigation activities, an on-base satellite accumulation area (Wright Circle) was selected to temporarily store the investigation-derived waste (IDW) generated during the RI field investigation. In addition, an underground utility clearance was conducted at Site 24 by Accumark, Inc., of Chesapeake, Virginia.

2.2 Buried Debris Delineation

During the 1993 Geophysical Survey, four major disposal areas (Areas B, C, E, and F) were identified, and test pitting activities were conducted during the SSP to confirm the presence of debris; however, these activities did not determine the full extent of buried debris. Therefore, test pit delineation activities were conducted between April 20 and 26, 2010, to determine the horizontal and vertical extent of buried debris present at Site 24. In addition, due to the potential for burning of explosives-contaminated waste and other base waste that may have occurred at the site, the test pitting activities were conducted to confirm the absence or presence of ash within the four major disposal areas. All 2010 test pitting activities were conducted in accordance with the SOP entitled *Trenching for Landfill Delineation* (CH2M HILL, 2010).

A total of 69 test pits were excavated in 2010 to delineate the lateral and vertical extent of buried debris within the four major disposal areas at Site 24 (**Figure 2-1**). Test pitting was conducted using a large backhoe with a 24-inch bucket capable of digging to a depth of 15 feet. Test pits ranged from 1 to 11 feet in depth and averaged 6 feet in length. Test pits were advanced until clean native soil was confirmed, it was determined that debris was

random and no additional debris would be encountered at deeper depths (as described below under the descriptions of deviations from the Site 24 SAP), the limits of the excavator reach were exceeded, or it was unsafe to continue excavating. Soils and waste streams encountered during test pitting were characterized and logged in accordance with Unified Soil Classification System (USCS) by a qualified geologist. During excavation, test pits were monitored with a photoionization detector (PID). Any responses from the PID (readings ranged from 0 to 0.7 parts per million [ppm]) were noted in the field book and test pit log. Test pit logs and associated photographs are provided within **Appendixes B and C** of this report, respectively. Following excavation, all soil and waste was placed back into the associated test pit, and the backfill was compacted, re-graded, and seeded.

Descriptions of the deviations from the Site 24 SAP (CH2M HILL, 2010) are discussed as follows:

- Test pits to delineate the lateral and vertical extent of buried debris were proposed in the Site 24 SAP. The presence of native soil in each test pit was used to determine the extent of buried debris. However, in Test Pits SB14 and SB15, the vertical extent of debris could not be confirmed because it was unsafe to excavate to deeper depths. In addition, in Test Pits 101, 110, 126, and 128, only one or two pieces of debris (as described in **Appendix B**) were observed in the test pit. Therefore, it was the professional opinion of the field staff that the debris in these test pits was more random or could have fallen into the test pit during excavation and no additional debris would be encountered at deeper depths.

Although native soil was not reached in a select few test pits, the depth of these test pits is adequate to achieve the project objectives.

2.3 Soil Sampling

Surface (0 to 6 inches) and subsurface soil (greater than 6 inches) samples were collected at the site from inside and outside the buried debris boundaries to better define the potential risks associated with each area (**Figure 2-6**). The subsurface soil samples are divided into four groups:

- Shallow subsurface soil samples collected from 6 to 24 inches bgs
- Deeper subsurface soil samples collected from depths greater than 24 inches bgs (below buried debris)
- A soil debris sample collected from within the buried debris encountered in one test pit
- A test pit subsurface soil sample collected from below a non-pressurized waterline that was inadvertently cracked during test pitting activities.

2.3.1 Surface Soil Sampling

Surface soil samples (24SS01 and 24SS05) were collected during the September 1997 RI field activities to supplement 1996 SSP surface soil data in order to determine the extent of surface soil contamination and potential risks to human health and the environment at Site 24 (**Figure 2-2**). In August 2007, the WPNSTA Yorktown Partnering Team agreed the impacts to surface soil were not adequately characterized; therefore, additional surface soil samples (YS24-SS01 through YS24-SS21) were collected in 2010 (**Figure 2-2**) to determine the nature and concentrations of contaminants inside and outside of the disposal areas.

The 1997 surface soil sampling activities were conducted in accordance with the 1997 Work Plan (Baker, 1997), and the 2010 surface soil sampling activities were conducted in accordance with the SOP entitled *Shallow Soil Sampling* (CH2M HILL, 2010). Surface soil samples were collected using a hand auger from a depth of 0 to 0.5 foot bgs.

Soil samples from both 1997 and 2010 were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives, total metals, and cyanide. In addition, one surface soil sample (24SS01) collected during the 1997 field activities was analyzed for total organic carbon (TOC), pH, grain size, cation exchange capacity (CEC), and bulk density. All surface soil samples collected during the 2010 field activities were also analyzed for TOC, pH, and grain size, in accordance with the Site 24 SAP (**Table 2-1**). After preparation and at the end of each day, samples were packed on ice and shipped to the laboratory (CompuChem of Cary, North Carolina) for analysis, in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2010).

Descriptions of the deviations from the Site 24 SAP (CH2M HILL, 2010) are discussed as follows:

- Ten surface soil samples from outside debris disposal areas and 11 surface soil samples from within the debris disposal areas were proposed in the Site 24 SAP. The disposal area boundaries, as defined during test pitting (**Section 2.1.1**), were considerably smaller than the estimated boundaries based on the previous geophysical survey; therefore, a smaller number of samples than originally planned actually fell within the boundaries of the disposal areas. As a result, a total of three surface soil samples (Y24-SS14, YS24-SS15, and YS24-SS20) were collected from inside the disposal areas, and a total of 18 surface soil samples (YS24-SS01 through YS24-SS13, YS24-SS16 through YS24-SS19, and YS24-SS21) were collected from outside the disposal areas (**Section 4.1**).

Although the number of surface soil samples collected deviated from number of surface soil samples proposed in the Site 24 SAP, due to the small size of the disposal area boundaries, an adequate number of samples were collected to achieve the project objectives.

2.3.2 Subsurface Soil Sampling

In August 2007, the WPNSTA Yorktown Tier I Partnering Team agreed that the impacts to subsurface soil had not been adequately characterized. Therefore, shallow and deep subsurface soil samples (YS24-SB01 through YS24-SB20) and test pit subsurface soil samples (YS24-SB20B and YS24-SB121) were collected in 2010 to supplement 1996 SSP subsurface soil data (**Figure 2-3**). The 2010 subsurface soil and test pit subsurface soil sampling activities were conducted in accordance with the SOPs entitled *Shallow Soil Sampling* (CH2M HILL, 2010) and *Soil Sampling* (CH2M HILL, 2010).

2.3.2.1 Shallow Subsurface Soil Sampling

Shallow subsurface soil samples (Y24-SB01 through Y24-SB09) were collected using a hand auger from a depth of 0.5 to 2 feet bgs. Soil samples were monitored with a PID during sample collection. No PID reading above 1 ppm was observed during sampling. These subsurface soil samples were collected in order to determine the extent of shallow subsurface soil contamination, to characterize vertical migration and potential accumulation of contaminants from surface soil, and to assess potential risk to human health and the environment.

2.3.2.2 Deep Subsurface Soil Sampling

Deep subsurface soil samples (YS24-SB010 through YS24-SB20) were collected using a backhoe from depths ranging between 5 and 11 feet bgs. Soil samples were monitored with a PID during sample collection. No PID reading above 1 ppm was observed during sampling. Deep subsurface soil samples collected from within the buried debris boundaries (YS24-SB14, YS24-SB15, and YS24-SB20) were collected in order to determine the extent of deep subsurface soil contamination, to characterize vertical migration and potential accumulation of contaminants below the buried debris, and to assess potential risk to human health and the environment. Deep subsurface soil samples collected from outside the buried debris boundaries (YS24-SB10 through YS24-SB13 and YS24-SB16 through YS24-SB19) were collected in order to determine the extent of subsurface soil contamination, to characterize contaminants outside the buried debris but within the magnetic anomalies, and to assess potential risk to human health and the environment.

2.3.2.3 Test Pit Subsurface Soil Sampling

During test pitting activities, several buried 55-gallon drums and metal pallets were observed in Disposal Area E. The drums were rusted and empty. A soil sample from within this buried debris was collected (YS24-SB20B) from 7 to 8 feet bgs using a backhoe. During soil sample collection, the soil was monitored with a PID; however, no PID readings above 0.7 ppm were observed. Soil sample YS24-SB20B was collected in order to determine whether the pallets and/or drum contents had impacted the underlying soils.

In addition, during the excavation of one test pit (TP121), an abandoned, non-pressurized waterline was inadvertently cracked and the contents of the line spilled into the test pit. As a result, a soil sample from immediately below the pooling water was collected to determine if subsurface soil had been impacted by the contents of the cracked waterline and to assess potential risk to human health and the environment, if necessary.

The shallow, deep, and test pit subsurface soil samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives, total metals, cyanide, TOC, pH, and grain size, in accordance with the Site 24 SAP (**Table 2-1**). In accordance with the Site 24 SAP, because ash was not observed during the 2010 field activities, subsurface soil samples were not analyzed for dioxins and furans. After preparation and at the end of each day, samples were packed on ice and shipped to the laboratory (CompuChem of Cary, North Carolina) for analysis, in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2010).

Descriptions of the deviations from the Site 24 SAP (CH2M HILL, 2010) are discussed as follows:

- Eleven deep subsurface soil samples (greater than 24 inches bgs) from below debris within the disposal areas were proposed in the Site 24 SAP. However, as a result of disposal area delineation activities (**Section 2.1.1**), the disposal areas were not as large as identified during the geophysical survey, and only three deep subsurface soil samples (Y24-SB14, YS24-SB15, and YS24-SB20) were collected from beneath the waste within the disposal areas. In addition, eight deep subsurface soil samples (YS24-SB10 through YS24-SB13 and YS24-SB16 through YS24-SB19) were collected from outside the disposal areas, but within the magnetic anomalies. These samples were originally intended to reflect conditions below the buried debris; however, no debris was encountered at these locations.

Although the number of deep subsurface soil samples collected from below debris within the disposal areas deviated from number of deep subsurface soil samples proposed from below debris within the disposal areas in the Site 24 SAP, due to the small size of the disposal area boundaries, an adequate number of samples were collected to achieve the project objectives.

2.4 Drainage Soil Sampling

Surface soil samples (24SS02, 24SS03, and 24SS04) were collected during the September 1997 RI field activities to supplement 1996 SSP soil data in order to determine the extent of surface soil contamination and potential risks to human health and the environment at Site 24 (**Figure 2-4**). These samples were later determined to have been collected from one of the site drainage areas. USEPA Region 3 Biological Technical Assistance Group (BTAG) personnel identified four distinct, grassy surface water drainage features at Site 24 during a site visit on December 6, 2007. These drainage areas are composed of soils only (that is, no sediment) and only support surface water during heavy rain events.

In August 2007, the WPNSTA Yorktown Partnering Team agreed that the impacts to surface soil within the drainage areas had not been adequately characterized; therefore, additional drainage surface soil samples (YS24-SS22 through YS24-SS31) were collected in 2010 (**Figure 2-4**) to determine the nature and concentrations of contaminants within the drainage areas. The drainage soil sample locations were based on recommendations from USEPA Region 3 BTAG during the December 6, 2007, site visit.

The 1997 surface soil sampling activities were conducted in accordance with the 1997 Work Plan (Baker, 1997), and the 2010 drainage soil sampling activities were conducted in accordance with the SOP entitled *Shallow Soil Sampling* (CH2M HILL, 2010). A stainless steel hand auger, spoon, and bowl were used to collect the drainage surface soil samples (0 to 0.5 foot bgs). Soil samples were monitored with a PID during sample collection. No PID reading above 1 ppm was observed during sampling.

Drainage soil samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives, total metals, and cyanide. In addition, one surface soil sample (24SS01) collected during the 1997 field activities was analyzed for TOC, pH, grain size, CEC, and bulk density. All surface soil samples collected during the 2010 field activities were analyzed for TOC, pH, and grain size, in accordance with the Site 24 SAP (CH2M HILL, 2010) (**Table 2-1**). Since ash was not observed during the 2010 field activities, drainage surface soil samples were not analyzed for dioxins and furans. After collection and at the end of each day, samples were packed on ice and shipped to the laboratory (CompuChem of Cary, North Carolina) for analysis, in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2010).

2.5 Groundwater Sampling

2.5.1 Monitoring Well Installation

Eight shallow monitoring wells (YS24-GW03 through YS24-GW10) were installed within the Columbia aquifer to depths up to 23 feet bgs, and two deep monitoring wells (YS24-GW01 and YS24-GW02) were installed within the Yorktown-Eastover aquifer to depths of 40 feet bgs (**Figure 2-5**) during the 2010 field mobilization. Following a review of the 2010 data and discussion with the USEPA and VDEQ, one additional shallow monitoring well (YS24-GW11) was installed within the Columbia aquifer to a depth of 23 feet bgs during the 2013 field mobilization. Each monitoring well was installed in accordance with the SOP entitled *General Guidance for Monitoring Well Installation* (CH2M HILL, 2010). The monitoring well construction details are summarized in **Appendix D**.

Parratt Wolff, Inc., of Hillsborough, North Carolina, provided hollow-stem auger (HSA) well drilling and installation services using a 4.25-inch-inside-diameter (ID) HSA and 2-foot-long acetate sleeves to provide lithologic descriptions. During soil logging, soil descriptions, including grain size, color, moisture content, relative density, consistency, soil structure, mineralogy, and other relevant information such as possible evidence of contamination, were recorded. Soil boring logs are included in **Appendix E**.

New monitoring wells were constructed with 2-inch-ID Schedule 40 polyvinyl chloride (PVC) casing and well screen (**Appendix D**). In accordance with the SOP entitled *Monitoring Well Installation* (CH2M HILL, 2010), the well screens were 10-foot-long with, 0.010-inch slot sizes. A silica sand filter pack was placed around the annular space of the well screen from the bottom of the boring/well screen to a depth of approximately 2 feet above the top of the screen. A bentonite layer (approximately 2 to 3 feet) was placed at the top of the sand pack. After the bentonite was hydrated for at least 24 hours, a cement-bentonite grout was placed in the remaining annular space to the surface. All monitoring wells were completed with steel stick-up casings and four protective bollards. A locking, watertight cap was placed on the top of each casing, and the well identification numbers were clearly marked on the well with etched well identification tags.

2.5.2 Monitoring Well Development

Prior to sampling, all monitoring wells were developed in order to restore the permeability of the aquifer material surrounding the well, which may have been reduced by the drilling operations, and to remove fine-grained materials that may have entered the well during installation. Monitoring well development was performed after the grout used to construct the new monitoring wells was allowed to adequately set (at least 24 hours or more) to prevent grout contamination of the screened interval. Monitoring wells were developed using a submersible pump and a combination of surging and pumping throughout the well screen.

Between 10 and 66 gallons of water were evacuated from each well, with a total of 419 gallons of water purged during the entire monitoring well development event. During monitoring well development, in accordance with the SOP entitled *Installation of Shallow Monitoring Wells* (CH2M HILL, 2010), water quality parameters (pH, oxidation-reduction potential [ORP], temperature, conductivity, turbidity, and dissolved oxygen [DO]) were recorded approximately every 5 minutes using a Horiba U-22 water quality meter. The Horiba U-22 instrument was calibrated daily, and calibration results were recorded in the field notebook.

Generally, development continued until at least three well volumes were removed and the water produced was free of turbidity, sand, and silt (to the maximum extent practicable); however, in the case of monitoring well MW08, only 10 gallons of water could be evacuated from the monitoring well over the 50-minute development time because it continued to go dry. The Horiba U-22 meter was used to determine when the turbidity was low (preferably less than 20 nephelometric turbidity units [NTUs]). If turbidity continued to decrease after the removal of three well volumes, monitoring was continued until turbidity readings stabilized (that is, until turbidity readings were within 10 percent for three consecutive readings). In addition, development typically ended once three successive measurements of pH, specific conductivity, and temperature were achieved (that is, until the readings for each measurement were within 10 percent of each other).

2.5.3 Groundwater Monitoring

A groundwater-level survey was conducted following the installation of the first 10 monitoring wells prior to sampling, and again five months following sampling. Following the installation of YS24-GW11, a third (July 2013) and fourth (September 2013) groundwater-level survey were conducted. The third groundwater-level survey was conducted prior to the groundwater sampling of YS24-GW11 and included data from all monitoring wells except for YS24-GW04, which could not be located at the time. The fourth groundwater-level survey included groundwater-level measurements from all 11 site monitoring wells. **Table 2-2** summarizes the groundwater-level measurements from each well. An electronic water-level meter was used to measure the depth to water from the marking on the top of casing to the nearest 0.01 foot.

2.5.4 Groundwater Sampling

Groundwater samples were collected from all monitoring wells, in accordance with the SOP entitled *Low-Flow Groundwater Sampling from Monitoring Wells* (CH2M HILL, 2010), in order to minimize drawdown and to obtain a sample representative of groundwater conditions in the surrounding geologic formation. Prior to groundwater sample preparation, monitoring wells were purged in order to remove any stagnant water that may have accumulated within the well. Groundwater samples were collected from wells with total depths of less than 30 feet using a peristaltic pump and disposable tubing. A Monsoon® submersible pump and disposable tubing were used for wells with depths greater than 30 feet. Groundwater quality parameters comprising pH, conductivity, turbidity, DO, temperature, and ORP were collected during the purging of each well, using a Horiba U-22 water quality meter and a flow-through cell.

Purging continued until water quality readings collected 5 minutes apart stabilized to within 10 percent of one another. Following parameter stabilization, a CHEMet test was used to confirm DO readings measured by the Horiba U-22 (Model Numbers K-7501 for 0 to 1 ppm and K-7512 for 1 to 12 ppm). Once DO confirmation was recorded, the flow-through cell was disconnected and samples were collected directly into laboratory-prepared, pre-preserved sample bottles. The final set of groundwater quality measurements recorded before sample collection for each monitoring well is presented in **Table 2-3**.

Groundwater samples were analyzed for organic and inorganic constituents and natural attenuation parameters, composed of VOCs, SVOCs, pesticides, PCBs, explosives, total and dissolved metals, cyanide, chloride, nitrate, nitrite, sulfate, alkalinity, pH, methane, ethane, and ethene, TOC, and sulfide. Groundwater for the analytical samples was pumped through the tubing directly into the appropriate laboratory-provided bottleware, with the exception of dissolved metals. Groundwater collected for dissolved metals analyses was pumped through a 0.45-µm (micron) filter and then directly into the sample bottleware. Since ash was not observed during the 2010 field activities, in accordance to the Site 24 SAP (CH2M HILL, 2010), the groundwater samples were not analyzed for dioxins/furans. After preparation and at the end of each day, samples were packed on ice and shipped to the laboratory (CompuChem of Cary, North Carolina) for analysis, in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2010). **Table 2-1** presents a summary of the monitoring wells sampled and the analyzed constituents.

2.5.5 Hydraulic Conductivity Testing

Hydraulic conductivity at the site was evaluated using single-well hydraulic conductivity tests, commonly referred to as “slug tests.” Due to the limited area of influence, the slug test data provide a rough estimate of the hydrogeologic parameters of the aquifer unit proximal to the individual monitoring wells. Falling-head slug tests were conducted by rapidly introducing a solid displacement device (slug) into the monitoring well being tested. The slug consisted of a 3-foot-long bailer filled with sand, and the water-level data were recorded using a Level Troll 700® pressure transducer coupled with the Rugged Reader. Data were recorded for each test until the water level had recovered to 90 percent of the pre-test level. The rising-head slug tests were conducted in accordance with the SOP entitled *Aquifer Slug Testing* (CH2M HILL, 2010) by rapidly withdrawing a slug that had been inserted into the monitoring well being tested following a period of time to allow the water level to equilibrate.

Since none of shallow groundwater wells fully penetrated the Columbia aquifer (static water level was measured below the top of the monitoring well screen), only one falling-head slug test was conducted at one monitoring

well (MW10). Both rising- and falling-head slug tests were conducted within the two Yorktown-Eastover aquifer monitoring wells, MW01 and MW02, because the entire length of the screens in these wells were within the aquifer (static water level was measured above the top of the monitoring well screen). The tested monitoring wells were selected to provide data throughout the extent of the aquifers at the site and to generate an overall estimate of the horizontal hydraulic conductivity (K_h) of the aquifers.

2.5.6 Surveying

During the buried waste delineation activities, a Trimble Geo-XT Global Positioning System (GPS) was used to record the horizontal coordinates of each test pit.

Michael Surveying & Mapping, P.C., of Newport News, Virginia (a Virginia-licensed and registered surveyor), conducted a survey of the new monitoring wells. Each of the monitoring wells was surveyed for vertical and horizontal control to an accuracy of ±0.01 foot and ±0.1 foot, respectively. Monitoring wells were surveyed at the top of the PVC casing (where marked) and at the ground surface. The vertical elevations were referenced to National Geodetic Vertical Datum 88 to remain consistent with the existing WPNSTA Yorktown vertical datum. Horizontal coordinates conformed to North American Datum 83 with ties to the Virginia State Plane Coordinate System. The survey reports for these sites is included as **Appendix F**.

2.6 Quality Assurance and Quality Control

Samples collected for this field investigation were analyzed using SW 846 Program methods with Level IV quality assurance (QA)/quality control (QC).

Field QA/QC samples were collected during the sampling program. These samples were obtained to:

- Ensure that disposable and reusable sampling equipment were free of contaminants
- Evaluate field methodology
- Establish ambient field background conditions
- Evaluate whether cross-contamination occurred during sampling and/or shipping

Several types of field QA/QC samples were collected and analyzed in accordance with the Site 24 SAP (CH2M HILL, 2010). They are defined as follows:

- **Equipment Rinsate Blank:** Six equipment rinsate blank samples were collected. These samples were obtained by running laboratory grade deionized (DI) water over and through sample collection equipment after the equipment was decontaminated (for reusable equipment) or prior to the equipment's use (for disposable equipment). These samples were used to determine if decontamination procedures for reusable equipment were adequate, and/or whether disposable, one-time-use equipment was contaminant-free prior to use.
- **Duplicate Sample:** Six duplicate samples were collected at the same time and under identical conditions as their respective associated sample. These samples were collected to evaluate reproducibility of sample results. One duplicate sample was collected for every 10 environmental samples collected (or 10 percent).
- **Field Blank:** Three field blank samples were collected. Field blanks were collected to evaluate potential impacts to samples due to ambient air conditions in the field. Samples were collected using laboratory-grade DI water, which was poured into sample bottles in the field under the same conditions under which environmental samples were collected.
- **Trip Blank:** Eleven trip blank samples were collected. Trip blanks were prepared at the laboratory, shipped with the sample containers, and stored onsite near the empty sample containers. Any time VOC samples were packed and shipped to the laboratory, a trip blank sample was included inside the shipping cooler. The trip blanks were analyzed for VOCs along with the other VOC samples. Trip blanks were used to evaluate whether or not cross-contamination of VOCs between sampling containers may have occurred during shipping.

In addition to samples collected to monitor field QC, samples were also collected to monitor quality within the laboratory. These included the following:

- **Matrix Spike (MS):** An aliquot of a matrix (either soil or water) was spiked with known quantities of specific compounds and subjected to the entire analytical procedure. By measuring recovery, the appropriateness of the method for the matrix was determined.
- **Matrix Spike Duplicate (MSD):** These samples were collected as second aliquots of the same matrix as the MS to determine the precision of the method.

One MS sample and one MSD sample were collected for every 20 environmental samples collected (or 5 percent of the samples collected) per medium per site. A total of four MS/MSD samples were collected.

2.7 Decontamination Procedures

All decontamination activities were conducted in accordance with the SOPs entitled *Decontamination of Drilling Rigs* and *Equipment* and *Decontamination of Personnel and Equipment*, as applicable (CH2M HILL, 2010). Disposable sampling equipment and personal protective equipment (PPE), such as Masterflex tubing and nitrile gloves, were treated as non-hazardous solid waste. After use, equipment was placed in plastic contractor bags and disposed of in an onsite trash dumpster. Non-disposable sampling equipment, such as hand augers, were decontaminated prior to each use.

Reusable heavy equipment, such as drilling rods and augers, were decontaminated before and in between the collection of each sample using a high-pressure steam cleaner with potable-grade water. Pressure-washing was conducted at the temporary decontamination pad, which had been constructed on the helicopter pad prior to the start of drilling activities. The decontamination pad consisted of a raised wood frame lined with a high-density polyethylene tarp, which acted as a basin to collect fluids. These fluids were then pumped into approved 55-gallon drums to await characterization and disposal. All heavy equipment decontamination procedures were conducted in accordance with the SOP entitled *Decontamination of Drilling Rigs and Equipment* (CH2M HILL, 2010).

Reusable sampling equipment, such as split-spoons and sampling trowels, were decontaminated using the following procedure:

1. Rinse equipment with potable water
2. Wash equipment with distilled water and 2.5 percent Liquinox solution, using a brush to remove any particulate matter or surface film
3. Rinse equipment with potable water
4. Rinse equipment with distilled or potable water and a 10 percent methanol solution
5. Rinse equipment with distilled water and allow to air dry
6. Wrap exposed areas with aluminum foil for transport and handling if not used immediately following decontamination

Water generated during decontamination of sampling equipment was collected and transferred to an approved 55-gallon drum to await characterization and disposal.

2.8 Investigation-derived Waste Management

IDW generated during the RI included soil cuttings, well development groundwater, and groundwater sampling purge-water, as well as decontamination rinse-water from non-disposable sampling equipment and heavy equipment. IDW was containerized in approved 55-gallon drums that were properly labeled and stored on secondary containment at Wright Circle, the approved IDW staging location. In total, 30 drums of solid IDW and 15 drums of aqueous IDW were generated during the 2010 RI field activities and 1 drum of solid IDW and 2 drums of aqueous IDW were generated during the 2013 RI field activities.

Prior to disposal, CH2M HILL field staff collected one composite sample from all aqueous IDW drums and one composite sample from all solid IDW drums. The IDW samples were analyzed for full Toxicity Characteristic Leachate Procedure (TCLP) analysis (VOCs, SVOCs, pesticides, and inorganic constituents), ignitability, reactive cyanide, reactive sulfide, and corrosivity. Based on the analytical results, all IDW was identified as non-hazardous and disposed of by Soilex Corporation at the company's approved disposal facility located in Chesapeake, Virginia, within 90 days of generation.

All IDW management activities were conducted in accordance with the IDW Management Plan (Baker, 2005). An analytical summary for the IDW samples collected is provided in **Table 2-4**. Laboratory analytical data for the IDW samples are presented in **Appendix G**. IDW handling and disposal information is included in **Appendix H.**

2.9 Data Quality Evaluation

The data quality evaluation and validation is a multi-tiered approach. The process begins with an internal laboratory review, continues with an independent review by a third-party validator, and ends with an overall review by the CH2M HILL project chemistry team. The results of data quality evaluation are included as **Appendix I**.

TABLE 2-1

Sample Summary Table

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Sample ID[1]	Matrix	Investigation	Sample Interval (bgs)	VOCs		SVOCs		Pesticides		PCBs		Explosives		Metals		Cyanide		TOC		pH	Grain Size	CEC / Bulk Density	Chloride / Nitrate / Nitrite / Sulfate	MEE	Alkalinity	Sulfide	Collection Method
				CLP[2]	SW846 8260B	CLP[2]	SW846 8270C	CLP[2]	SW846 8081A	CLP[2]	SW846 8082	SW8330	SW846 8330	CLP[2]	SW846 6020 /	CLP[2]	SW846-9014	Lloyd Kahn	SW846-9060	SW846 9045C	ASTM D422	--	USEPA 300.0	RSK-175	USEPA 310.0	USEPA 376.1	
A06SS06-00	Surface Soil	SSP	0-0.5'	X		X		X		X		X		X		X				X							Hand Auger
A06SS07-00				X		X		X		X		X		X		X				X							
A06SS08-00				X		X		X		X		X		X		X				X							
A06SS08D-00				X		X		X		X		X		X		X				X							
A06SS09-00						X		X		X		X		X		X				X							
A06SS10-00						X		X		X		X		X		X				X							
A06SS11-00				X		X		X		X		X		X		X				X							
A06SS12-00				X		X		X		X		X		X		X				X							
A06SS12-00D				X		X		X		X		X		X		X				X							
A06SS13-00				X		X		X		X		X		X		X				X							
A06SS14-00				X		X		X		X		X		X		X				X							
A06SS15-00				X		X		X		X		X		X		X				X							
A06SS16-00				X		X		X		X		X		X		X				X							
A06SS17-00				X		X		X		X		X		X		X				X							
A06TP01-01			0-2'	X		X		X		X		X		X		X				X							
A06TP03-01			0-4'	X		X		X		X		X		X		X				X							
A06TP04-01			0-3'	X		X		X		X		X		X		X				X							
A06TP05-01			0-2'	X		X		X		X		X		X		X				X							
24SS01		1997 RI		X		X		X		X		X		X		X		X		X	X	X					
24SS05				X		X		X		X		X		X		X											
YS24-SS01-0410		2010 RI			X		X		X		X		X		X		X	X		X	X						
YS24-SS01P-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS02-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS03-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS04-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS05-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS06-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS07-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS08-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS09-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS10-0410			0-0.5'		X		X		X		X		X		X		X	X		X	X						
YS24-SS11-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS11P-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS12-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS13-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS14-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS15-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS16-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS17-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS18-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS19-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS20-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SS21-0410					X		X		X		X		X		X		X	X		X	X						
A06SB03-01	Subsurface Soil	SSP	1-3'	X		X		X		X		X		X		X											Hand Auger
A06SB03-01D			1-3'	X		X		X		X		X		X		X											
A06SB03-05			9-11'	X		X		X		X		X		X		X											
A06SB03-07			13-15'	X		X		X		X		X		X		X											
A06SB04-01			1-3'	X		X		X		X		X		X		X											
A06SB04-05			9-11'	X		X		X		X		X		X		X											
A06SB04-08			15-17'	X		X		X		X		X		X		X											
A06SB05-01			1-3'	X		X		X		X		X		X		X											
A06SB05-05			9-11'	X		X		X		X		X		X		X											
A06SB05-05D			9-11'	X		X		X		X		X		X		X											
A06SB05-06			11-13'	X		X		X		X		X		X		X											
A06SB06-01			1-3'	X		X		X		X		X		X		X											
A06SB06-04			7-9'	X		X		X		X		X		X		X											
A06SB06-04D			7-9'	X		X		X		X		X		X		X											
A06SB06-06			11-13'	X		X		X		X		X		X		X											
A06SB10-01			1-3'	X		X		X		X		X		X		X											
A06SB10-05			9-11'	X		X		X		X		X		X		X											
A06SB10-07			13-15'	X		X		X		X		X		X		X											

TABLE 2-1

Sample Summary Table

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Sample ID[1]	Matrix	Investigation	Sample Interval (bgs)	VOCs		SVOCs		Pesticides		PCBs		Explosives		Metals		Cyanide		TOC		pH	Grain Size	CEC / Bulk Density	Chloride / Nitrate / Nitrite / Sulfate	MEE	Alkalinity	Sulfide	Collection Method
				CLP[2]	SW846 8260B	CLP[2]	SW846 8270C	CLP[2]	SW846 8081A	CLP[2]	SW846 8082	SW8330	SW846 8330	CLP[2]	SW846 6020 /	CLP[2]	SW846-9014	Lloyd Kahn	SW846-9060	SW846 9045C	ASTM D422	--	USEPA 300.0	RSK-175	USEPA 310.0	USEPA 376.1	
A06TP01-02	Subsurface Soil (cont.)	SSP (cont.)	3'	X		X		X		X		X		X		X											Backhoe
A06TP02-02			13'	X		X		X		X		X		X		X											
A06TP03-02			4.5'	X		X		X		X		X		X		X											
A06TP04-02			3-4'	X		X		X		X		X		X		X											
A06TP05-02			2-3'	X		X		X		X		X		X		X											
A06TP06-02			4-6'	X		X		X		X		X		X		X											
YS24-SB01-0.5-2-0410		2010 RI	0.5-2'		X		X		X		X		X		X		X	X		X	X						Hand Auger
YS24-SB02-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB02P-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB03-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB04-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB05-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB06-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB07-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB08-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB09-0.5-2-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB10-5-6-0410			5-6'		X		X		X		X		X		X		X	X		X	X						Backhoe
YS24-SB11-5-6-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB12-5-6-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB12P-5-6-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB13-5-6-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB14-10-11-0410			10-11'		X		X		X		X		X		X		X	X		X	X						
YS24-SB15-7-8-0410			7-8'		X		X		X		X		X		X		X	X		X	X						
YS24-SB16-5-6-0410			5-6'		X		X		X		X		X		X		X	X		X	X						
YS24-SB17-5-6-0410					X		X		X		X		X		X		X	X		X	X						
YS24-SB18-7-8-0410			7-8'		X		X		X		X		X		X		X	X		X	X						
YS24-SB19-5-6-0410			5-6'		X		X		X		X		X		X		X	X		X	X						
YS24-SB20-7-8-0410			7-8'		X		X		X		X		X		X		X	X		X	X						
A06TP02-01	Soil within Buried Debris	SSP	1-9'	X		X		X		X		X		X		X											Backhoe
A06TP06-01			2-3'	X		X		X		X		X		X		X											
YS24-SB121-0410-SO		2010 RI	4-5'		X		X		X		X		X		X		X										Backhoe
YS24-SB20B-7-8-0410			7-8'		X		X		X		X		X		X		X										
24SS02	Surface Soil from Drainage Areas	1997 RI	0-0.5'	X		X		X		X		X		X		X		X		X	X	X					Hand Auger
24SS03				X		X		X		X		X		X		X											
24SS03D				X		X		X		X		X		X		X											
24SS04				X		X		X		X		X		X		X											
YS24-SS22-0410		2010 RI			X		X		X		X		X		X			X		X	X						
YS24-SS23-0410					X		X		X		X		X		X			X		X	X						
YS24-SS24-0410					X		X		X		X		X		X			X		X	X						
YS24-SS25-0410					X		X		X		X		X		X			X		X	X						
YS24-SS26-0410					X		X		X		X		X		X			X		X	X						
YS24-SS26P-0410					X		X		X		X		X		X			X		X	X						
YS24-SS27-0410					X		X		X		X		X		X			X		X	X						
YS24-SS28-0410					X		X		X		X		X		X			X		X	X						
YS24-SS29-0410					X		X		X		X		X		X			X		X	X						
YS24-SS30-0410					X		X		X		X		X		X			X		X	X						
YS24-SS31-0410					X		X		X		X		X		X			X		X	X						
YS24-GW01D-0610	Groundwater	Middle of well screen	30-40'		X		X		X		X		X		X		X										Monsoon Pump and Tubing
YS24-GW02D-0610			32-42'		X		X		X		X		X		X		X										
YS24-GW03S-0610			9.5-19.5'		X		X		X		X		X		X		X										Peristaltic Pump and Tubing
YS24-GW03SP-0610			9.5-19.5'		X		X		X		X		X		X		X										
YS24-GW04S-0610			13-23'		X		X		X		X		X		X		X										
YS24-GW05S-0610			11-21'		X		X		X		X		X		X		X										
YS24-GW06S-0610			9.5-19.5'		X		X		X		X		X		X		X		X	X			X	X	X	X	
YS24-GW07S-0610			11-21'		X		X		X		X		X		X		X										
YS24-GW08S-0610			12-22'		X		X		X		X		X		X		X		X	X			X	X	X	X	
YS24-GW09S-0610			11-21'		X		X		X		X		X		X		X										
YS24-GW10S-0610			12.5-22.5'		X		X		X		X		X		X		X		X	X			X	X	X	X	
YS24-GW10S-0611			13-23'		X		X		X		X		X		X		X		X	X			X	X	X	X	

[1] Labels containing D or P indicate a duplicate sample.

[2] As documented in the 1994 Master Project Plans for Naval Weapons Station Yorktown

TABLE 2-2

Groundwater Elevations

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Well ID	TOC	June 14, 2010		November 9, 2010		July 16, 2013		September 9, 2013	
		DTW	Elevation	DTW	Elevation	DTW	Elevation	DTW	Elevation
MW-01	31.65	17.95	13.70	18.02	13.63	16.90	14.75	17.19	14.46
MW-02	32.83	20.2	12.63	20.65	12.18	19.38	13.45	19.52	13.31
MW-03	31.87	18.14	13.73	18.66	13.21	17.33	14.54	17.58	14.29
MW-04	32.39	18.76	13.63	18.64	13.75	N/A	N/A	17.73	14.66
MW-05	33.21	20.01	13.20	19.86	13.35	18.31	14.90	18.75	14.46
MW-06	32.54	18.72	13.82	18.9	13.64	17.76	14.78	18.05	14.49
MW-07	32.56	19.16	13.40	19.81	12.75	18.25	14.31	18.67	13.89
MW-08	33.42	21.85	11.57	22.14	11.28	21.25	12.17	21.21	12.21
MW-09	31.12	17.98	13.14	17.94	13.18	17.23	13.89	17.38	13.74
MW-10	32.27	18.25	14.02	18.29	13.98	17.34	14.93	17.58	14.69
MW-11	31.83	N/A	N/A	N/A	N/A	17.05	14.78	17.31	14.52

Notes:

TOC = Top of Casing

DTW = Depth to Water

N/A = Not Applicable, Monitoring Well not installed yet

TABLE 2-3

Groundwater Field Parameter Results

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	YS24-GW01	YS24-GW02	YS24-GW03	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06
Sample ID	YS24-GW01D-0610	YS24-GW02D-0610	YS24-GW03S-0610	YS24-GW04S-0610	YS24-GW05S-0610	S24-GW06S-061
Sample Date	6/15/2010	6/15/2010	6/15/10	6/16/10	6/16/10	6/16/2010
Field Parameter						
Dissolved Oxygen (mg/L)	6.95	5.91	8.34	8.46	8.74	9.57
Chemets Dissolved Oxygen (mg/L)	2	1	4	7	5.5	5.5
Oxidation Reduction Potential (mV)	-126	-129	174	138	141	158
pH	7.27	9.34	6.88	6.73	7.09	6.97
Specific Conductivity (mS/cm)	0.952	0.873	0.687	0.654	0.64	0.648
Temperature (°C)	18.3	19.7	16.9	16.9	18.7	16.8
Turbidity (NTU)	0	0	18.8	0	20.1	0
Nitrite (mg/L)	NA	NA	NA	NA	NA	0.4 U
Nitrate (mg/L)	NA	NA	NA	NA	NA	0.254 J
Sulfide (mg/L)	NA	NA	NA	NA	NA	1 U

Station ID	YS24-GW/SO07	YS24-GW/SO08	YS24-GW/SO09	YS24-GW10	YS24-GW11
Sample ID	YS24-GW07S-0610	YS24-GW08S-0610	YS24-GW09S-0610	YS24-GW10S-0610	YS24-GW11-0713
Sample Date	6/16/2010	6/15/10	6/15/10	6/15/10	7/8/13
Field Parameter					
Dissolved Oxygen (mg/L)	10.87	7.54	8.9	7.95	3.61
Chemets Dissolved Oxygen (mg/L)	7	3	5.5	4	NR
Oxidation Reduction Potential (mV)	169	-58	139	157	86.4
pH	6.9	6.81	7	7.15	6.91
Specific Conductivity (mS/cm)	0.603	0.544	0.701	0.0485	0.561
Temperature (°C)	15.7	18	19.7	15.5	17.76
Turbidity (NTU)	1.9	40.6	0	0	6.9
Nitrite (mg/L)	NA	0.4 U	NA	0.4 U	0.1 U
Nitrate (mg/L)	NA	0.587	NA	0.349 J	0.268
Sulfide (mg/L)	NA	1 U	NA	1 U	1.69 U

Notes:

C - Degrees centigrade

mg/L - Milligrams per liter

mS/cm - Milliseimens per centimeter

mV - Millivolts

NTU - Nephelometric turbidity unit

pct - Percent

NA - Not analyzed

NR - Not Recorded

TABLE 2-4

IDW Detected Analytical Results - May 2010

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Sample ID	IDW-S-051910	IDW-W-051910	YS12-IDWAQ-060513	YS12-IDWSO-060513
Sample Date	5/19/10	5/19/10	6/5/13	6/5/13
Chemical Name				
TCLP Volatile Organic Compounds (UG/L)				
Chloroform	25 U	0.58 J	0.1 U	0.1 U
TCLP Semivolatile Organic Compounds (UG/L)				
No Detections				
TCLP Pesticides/Polychlorinated Biphenyls (UG/L)				
No Detections				
TCLP Herbicides (UG/L)				
No Detections				
TCLP Metals (UG/L)				
Arsenic	15.2 B	2500 U	0.041 J	0.1 U
Barium	135 B	27.9 B	0.11 J	0.43
Cadmium	5.5 B	500 U	0.01 U	0.0045 J
Chromium	3.6 B	2.8 B	0.02 U	0.02 U
Lead	22.2 B	3.6 B	0.05 U	0.05 U
Selenium	12.7 B	500 U	0.1 U	0.1 U

Notes:

B - Analyte not detected above the level reported in blanks

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

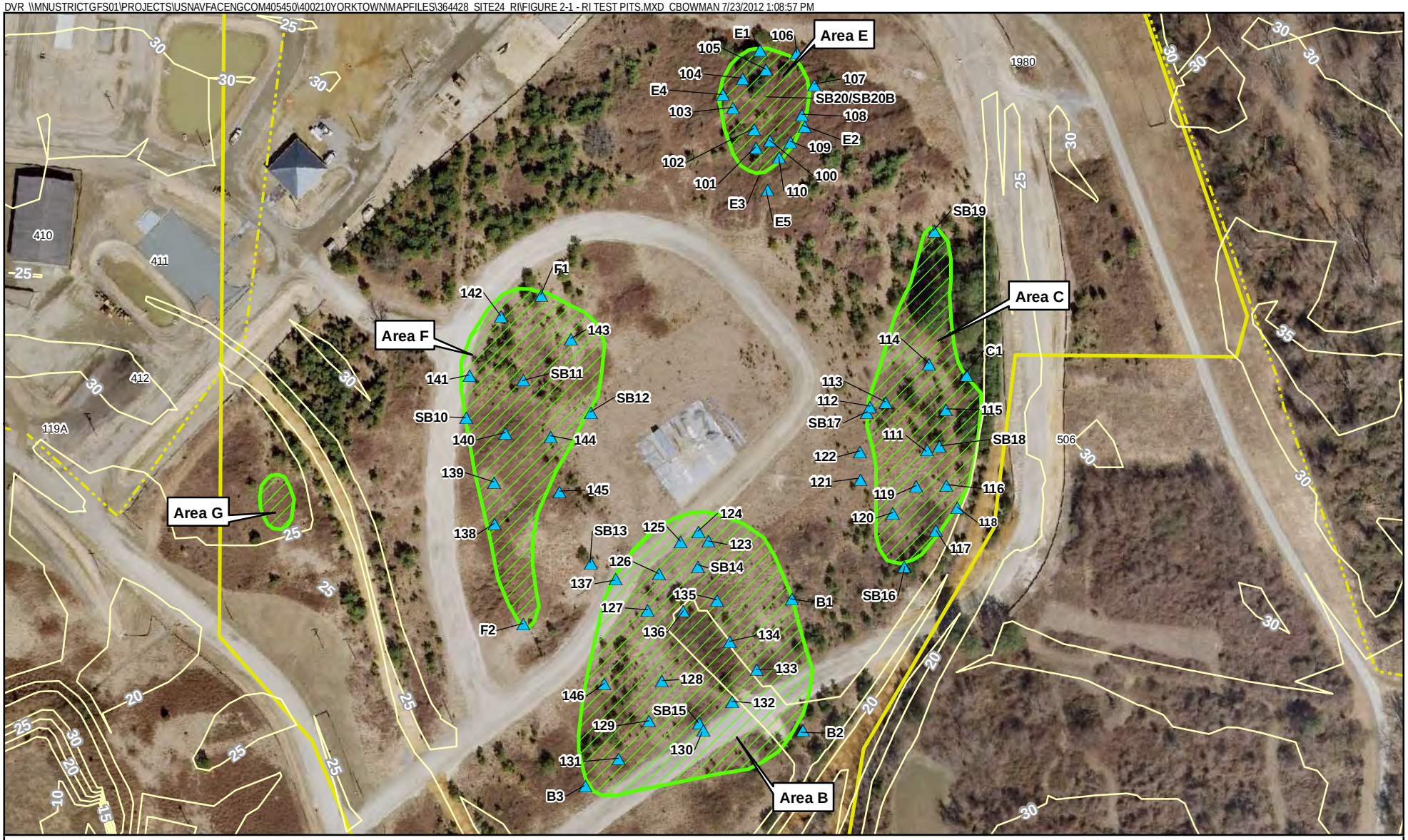
NS - Not sampled

U - The material was analyzed for, but not detected

UG/L - Micrograms per liter

Shading indicates detection

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 2-1 - RI TEST PITS.MXD CBOWMAN 7/23/2012 1:08:57 PM



Legend

- Test Pit Locations (2010)
- Elevation Contour (5 ft interval)
- Fences
- Magnetic Anomalies (SSP, 1994)
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)

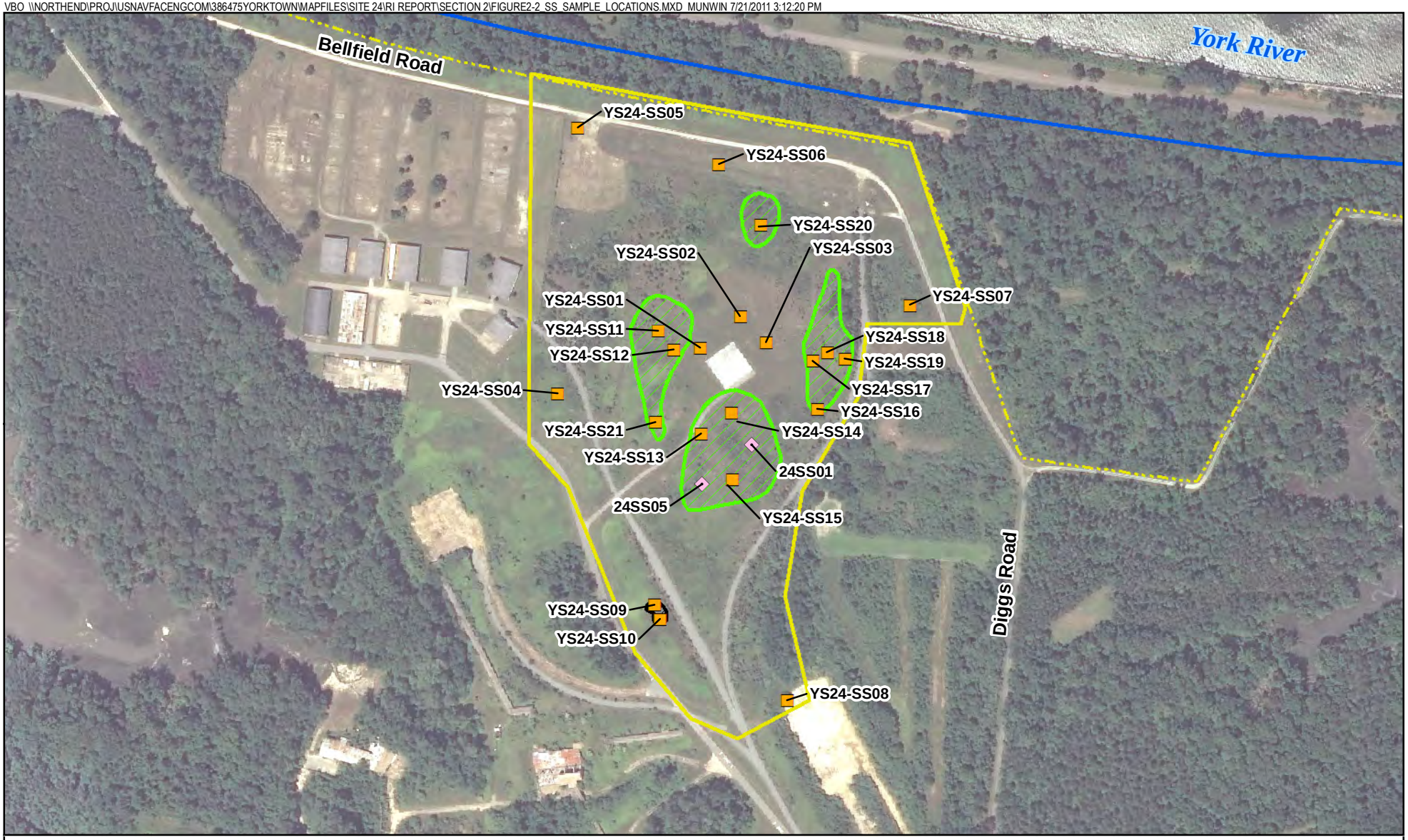
N
W E
S

0 85 170
Feet

Figure 2-1
Remedial Investigation Test Pit Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 2\FIGURE2-2_SS_SAMPLE_LOCATIONS.MXD MUNWIN 7/21/2011 3:12:20 PM



Legend

- Surface Soil Sample Locations (1997)
- Surface Soil Sample Locations (2010)
- Naval Weapons Station Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Magnetic Anomalies (SSP, 1994)
- Black Sludge-like Material (SSP, 1996)
- Fences

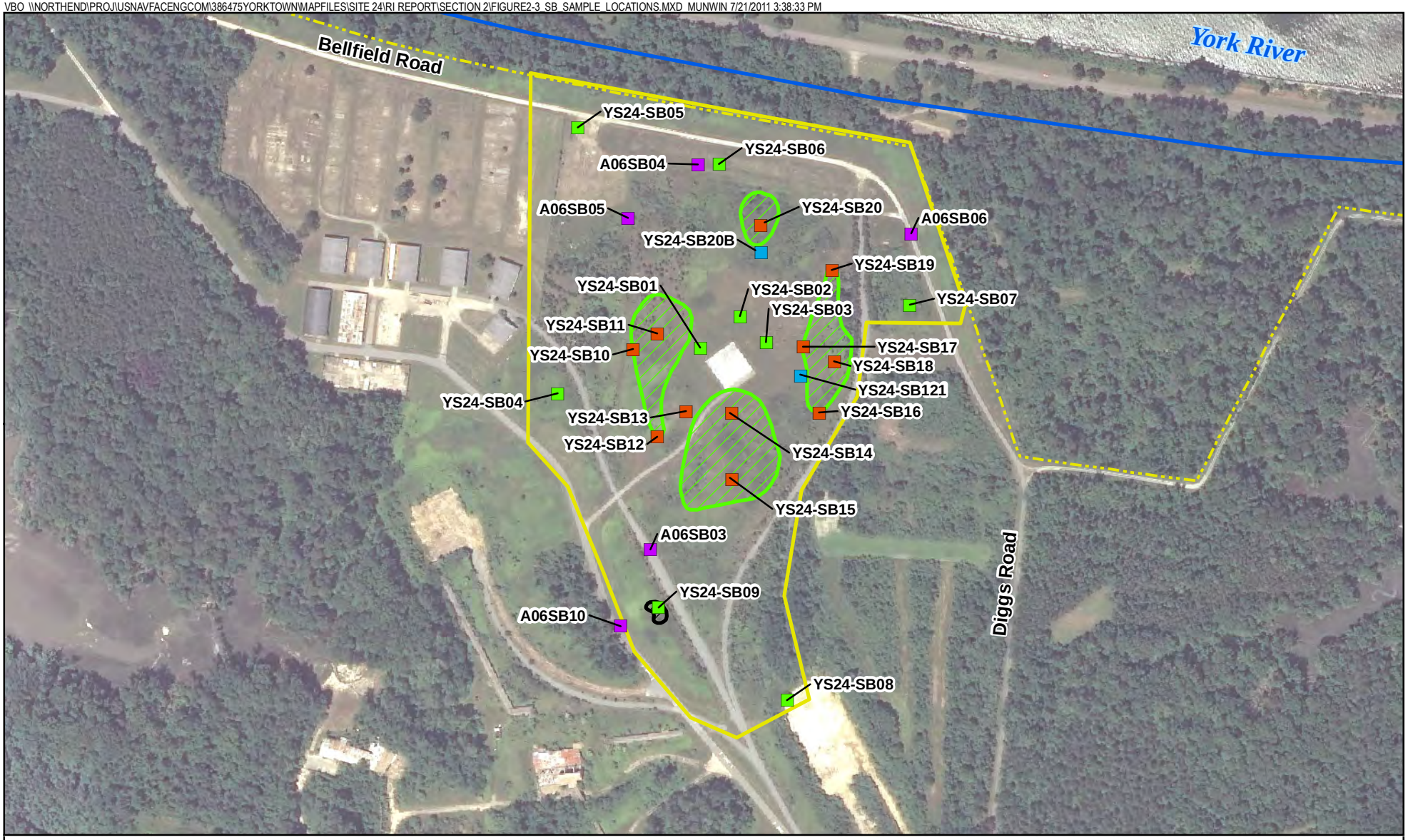
N
W E
S

0 200 400
Feet

Figure 2-2
Remedial Investigation Surface Soil Sample Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 2\FIGURE2-3_SB_SAMPLE_LOCATIONS.MXD MUNWIN 7/21/2011 3:38:33 PM



Legend

- Subsurface Soil Sample Locations (2010)
- Shallow Subsurface Soil Sample Locations
- Deep Subsurface Soil Sample Locations
- Test Pit Subsurface Soil Sample Locations
- Naval Weapons Station Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Magnetic Anomalies (SSP, 1994)
- Black Sludge-like Material (SSP, 1996)
- Fences

N
W E
S

0 200 400
Feet

Figure 2-3
Remedial Investigation Subsurface Soil Sample Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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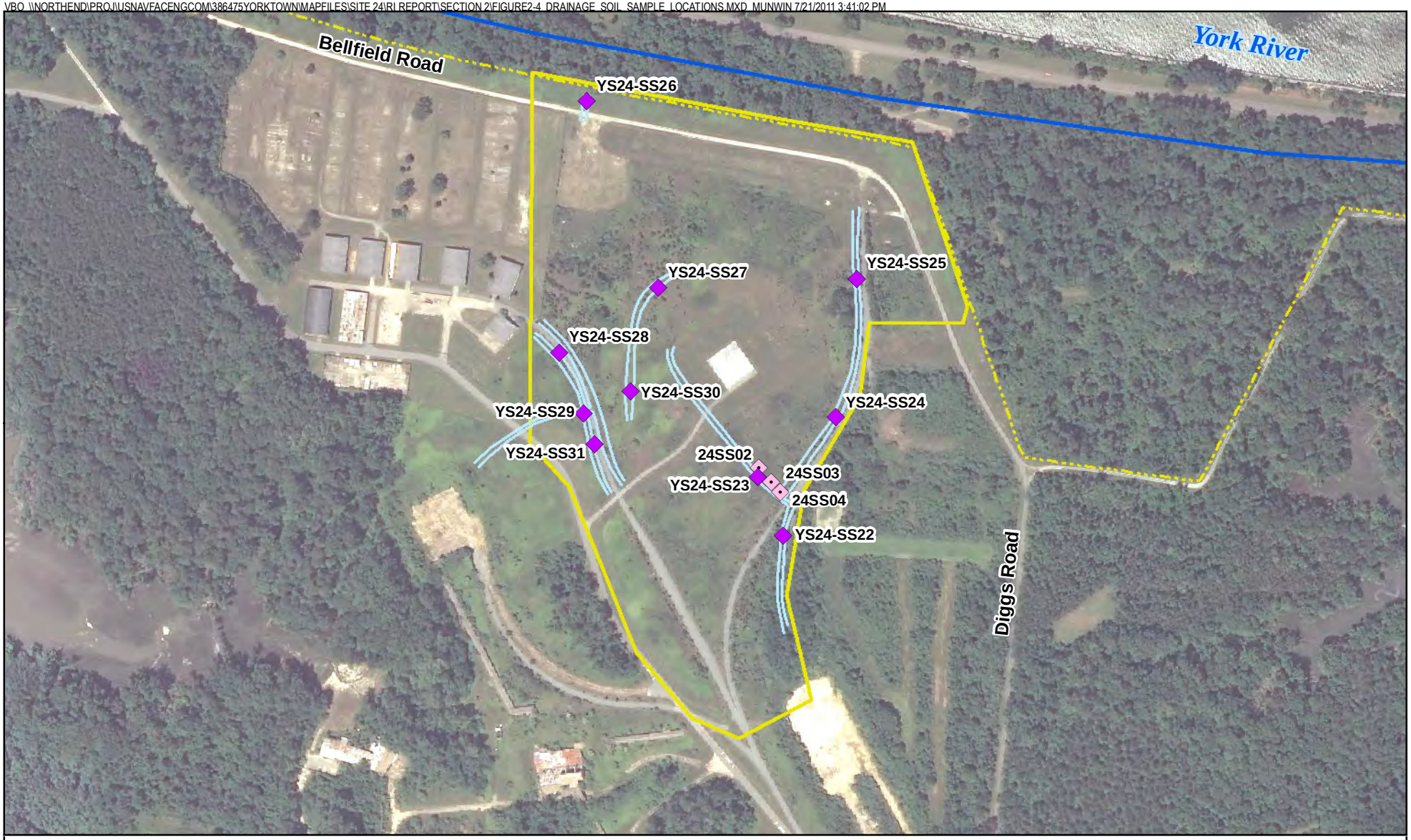
VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 2\FIGURE2-4_DRAINAGE_SOIL_SAMPLE_LOCATIONS.MXD MUNWIN 7/21/2011 3:41:02 PM



Legend

- Surface Soil Sample Locations (1997)
- Surface Soil Sample Locations (2010)
- Naval Weapons Station Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Drainage Swales
- Fences

N
W E
S

0 200 400
Feet

Figure 2-4
Remedial Investigation Drainage Soil Sample Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\REVISED_FINAL_RI\FIGURE 2-5 - MW LOCATIONS.MXD CBOWMAN 1/10/2014 9:02:42 AM

Legend

- Monitoring Well (Columbia Aquifer)
- Monitoring Well (Yorktown-Eastover Aquifer)
- Fences
- Naval Weapons Station Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)

N
W E
S

0 200 400
Feet

Figure 2-5
Remedial Investigation Monitoring Well Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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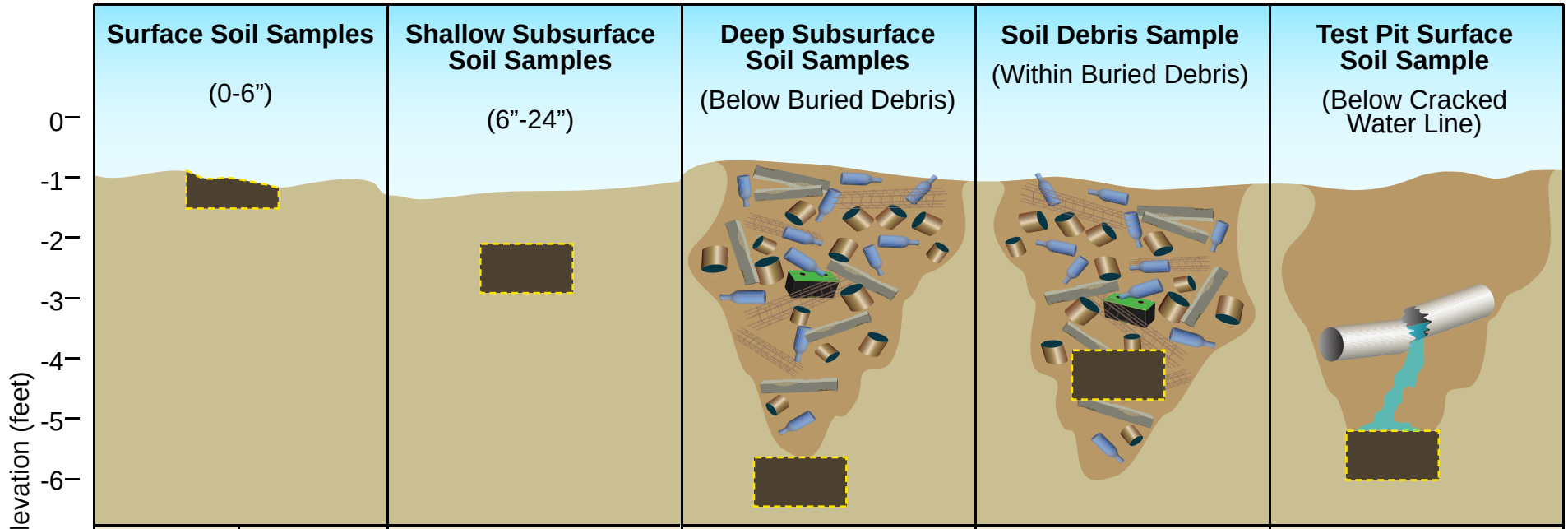


Surface Soil Samples (0-6")		Shallow Subsurface Soil Samples (6"-24")	Deep Subsurface Soil Samples (Below Buried Debris)	Soil Debris Sample (Within Buried Debris)	Test Pit Surface Soil Sample (Below Cracked Water Line)
24SS01	YS24-SS11	YS24-SB01	YS24-SB10	YS24-SB20B	YS24-SB121
24SS05	YS24-SS12	YS24-SB02	YS24-SB11		
YS24-SS01	YS24-SS13	YS24-SB03	YS24-SB12		
YS24-SS02	YS24-SS14	YS24-SB04	YS24-SB13		
YS24-SS03	YS24-SS15	YS24-SB05	YS24-SB14		
YS24-SS04	YS24-SS16	YS24-SB06	YS24-SB15		
YS24-SS05	YS24-SS17	YS24-SB07	YS24-SB16		
YS24-SS06	YS24-SS18	YS24-SB08	YS24-SB17		
YS24-SS07	YS24-SS19	YS24-SB09	YS24-SB18		
YS24-SS08	YS24-SS20		YS24-SB19		
YS24-SS09	YS24-SS21		YS24-SB20		
YS24-SS10					

FIGURE 2-6
Conceptual Soil Sampling Diagram
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

SECTION 3

Physical Characteristics

This section presents an evaluation of the Site 24 physical characteristics pertaining to the surface features and conceptual hydrogeology of the site. The physical setting of Site 24, including meteorology, topography, land and groundwater use, and geology and hydrogeology, are summarized in this section.

A detailed hydrogeologic conceptual model is important to describe the primary mechanisms that control the fate and migration of contaminants in groundwater. The hydrogeologic conceptual model provides the foundation for the development of the overall CSM for Site 24. The physical characteristics also support the HHRAs and ERAs.

3.1 Meteorology

The climate of the Virginia Peninsula is influenced by the moderating effects of the Atlantic Ocean, resulting in mild winters and long, warm summers. High humidity occurs frequently along the coast and less frequently inland. The average relative humidity in mid-afternoon is approximately 60 percent. Humidity is higher at night, and the average humidity at dawn is approximately 80 percent. Ground fog is a frequent weather occurrence in late summer, especially during early morning hours.

Freezing temperatures occur intermittently from October through March. The average monthly temperatures in the area range from approximately 40 degrees Fahrenheit (°F) in January to 80°F in July.

York County is subject to easterly storms throughout late summer and early fall, which causes high tides and coastal flooding. Intense tropical hurricanes occasionally sweep the coast. Winter storms that move along the eastern seaboard are often associated with high winds and precipitation, occasionally in the form of snow, ice pellets, or rain; however, the snow is seldom prolonged or heavy. The average annual precipitation is approximately 45 inches, with the summer months being the wettest and the winter months being the driest.

3.2 Topography and Surface Features

Site 24 is generally grassy with some overgrown brush located throughout the site. Site 24 is located approximately 28 feet above mean sea level (amsl), with little variation in topography. Although there is no standing surface water at Site 24, surface water runoff during rain events is expected to flow into the site drainage swales (**Figure 1-2**), where it will infiltrate to recharge groundwater or evaporate.

3.3 Land and Water Use

WPNSTA Yorktown is a secure military installation that occupies 10,624 acres. Site 24 is approximately 37 acres and is located within a restricted area of WPNSTA, for which a special access badge is required to enter. In addition, since Site 24 and the surrounding area is scheduled to be used by JIEDDO as a training facility, access to the site must be coordinated with JIEDDO. The JIEDDO facility consists of practice roadways and buildings intended for the training of military personnel in the identification and disarmament of improvised explosives. This facility was completed in late 2010, and the future site use is expected to remain the same as the current site use.

The sole source of domestic water supply for WPNSTA Yorktown and its surrounding communities is the City of Newport News Waterworks. Groundwater at the Base flows towards the York River and its tributaries. The state of Virginia does not use groundwater use classifications; therefore, all groundwater at WPNSTA Yorktown is considered to be of potential beneficial use. However, there are no drinking water wells at WPNSTA Yorktown; four previous water supply wells have been abandoned.

There are no fresh surface water bodies within the vicinity of Site 24 that could be used as a potable water supply.

3.4 Hydrogeology

3.4.1 Geology

WPNSTA Yorktown is situated within the Virginia Coastal Plain Physiographic Province. The Virginia Coastal Plain is characterized by unconsolidated sediments of Quaternary, Tertiary, and Cretaceous ages. The sediments thicken eastward from the Fall Line (approximately 70 miles west of WPNSTA) and are approximately 6,000 feet thick below the Eastern Shore Peninsula (Meng and Harsh, 1988).

Deposition and erosion associated with fluctuating sea levels resulted in terraces that decrease in topographic elevation in a stair-step pattern, with scarps oriented north to south, that delineate the eroded shoreline along the toe of each terrace (Brockman et al., 1997). Two terraces (Lackey Plain and Croaker Flat) are divided by one scarp (the Camp Peary Scarp) within the boundaries of WPNSTA Yorktown. Site 24 is located on the lower terrace, Croaker Flat (**Figure 3-1**).

Ten geologic formations have been identified beneath WPNSTA, as shown on **Figure 3-2** (Brockman et al., 1997). The upper-most geologic formations consist of alluvial, colluvial, and marsh deposits composed of silt, sand, and pebbles with some clay. The majority of the surficial unconsolidated sediment has been mapped as the Pleistocene (Quaternary) Windsor Formation (Mixon et al., 1989).

Monitoring well lithologic data from the RI provide descriptions of the Site 24 subsurface geology. Two simplified hydrogeologic cross-sections of the site, oriented to facilitate correlation among the monitoring wells (**Figure 3-3**), are shown on **Figures 3-4** and **3-5**. Soil boring logs are provided in **Appendix E**.

The uppermost subsurface geology in the area of Site 24 is characterized by the Pleistocene (Quaternary) Shirley Formation and the Pliocene (Tertiary) Yorktown Formation (Mixon et al., 1989). The Shirley Formation is relatively thin, only occurs within topographically higher areas located adjacent to the site, and consists of sand, gravel, silt, clay, and trace amounts of organics. The uppermost portion of the Yorktown Formation (Yorktown confining unit) consists of shell hash, clayey or sandy shell hash, very-fine to medium-grained sand, or shelly clay. The lower portion of the Yorktown Formation (Yorktown-Eastover aquifer) consists of very-fine to fine-grained sand, silt, or sandy clay.

3.4.2 Hydrostratigraphy

Each geologic unit was grouped into hydrostratigraphic units based upon their hydrologic characteristics (Lazniak and Meng, 1988; Brockman et al., 1997). Based upon the hydraulic characteristics of the geologic units present, the uppermost eight (Cobham Bay Member of the Eastover Formation through the Tabb Formation) of the 10 geologic formations have been identified as the York County Shallow Aquifer System. As shown on **Figure 3-2**, the following five hydrogeologic units make up the York County Shallow Aquifer System at WPNSTA Yorktown:

- Columbia aquifer (consisting of the Windsor through Tabb Formations)
- Cornwallis Cave confining unit (consisting of the Bacons Castle Formation)
- Cornwallis Cave aquifer (consisting of the upper Moore House Member of the Yorktown Formation and the Sedley Formation)
- Yorktown confining unit (consisting of the upper Morgarts Beach and lower Moore House Members of the Yorktown Formation)
- Yorktown-Eastover aquifer (consisting of the Cobham Bay through Rushmere Members of the Yorktown Formation)

In the area of Site 24, the silts and sands associated with the Columbia aquifer are present at the ground surface to a maximum depth of approximately 16 feet bgs in the topographically higher areas. However, the aquifer is generally unsaturated. Underlying the Columbia aquifer is the Yorktown confining unit.

The Yorktown confining unit is generally 5 to 10 feet thick and separates the underlying Yorktown aquifer from the Columbia aquifer. In the vicinity of Site 24, the Cornwallis Cave aquifer and confining unit are not present due

to erosion during fluctuations in sea level. During recent drilling of monitoring wells at Site 24, the Yorktown confining unit was found to be characterized by sandy clay to clay.

Underlying the Yorktown confining unit are the coarse-grained to fine-grained sand, silty- sand, and shell fragments of the Yorktown-Eastover aquifer. The aquifer is generally confined to semi-confined where it underlies the Yorktown confining unit. Based on the general thickness reported at WPNSTA Yorktown, saturated thickness is approximately 80 feet in the vicinity of Site 24 and overlies the approximately 100- to 200-foot-thick Eastover-Calvert confining unit. Recharge to the aquifer is by the infiltration of precipitation. No groundwater production from the Yorktown-Eastover aquifer occurs in the area.

3.4.3 Aquifer Properties

Aquifer hydraulic conductivity ("slug") testing was performed at one monitoring well within the Columbia aquifer (MW10) and two monitoring wells (MW01 and MW02) within the Yorktown-Eastover aquifer. The K_h values were calculated using falling-head test data within the Columbia aquifer (MW10) and using both falling- and rising-head test data within the Yorktown-Eastover aquifer (MW01 and MW02).

The slug tests were analyzed using the Bouwer and Rice Method included in *A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrative Wells. Water Resources Research 12:423-28* (Bouwer and Rice, 1976). The K_h values were reported for both rising- and falling-head methods when the static water-level occurred within the riser pipe portion of the monitoring well (that is, above the screen interval). **Table 3-1** summarizes the results of the testing. The slug test data sets were analyzed by AQTESOLV software using the Bouwer-Rice solution method; the plots are provided in **Appendix J**.

The K_h value in the Columbia aquifer was measured at 5.9 feet per day (ft/day). This value falls within the reported range of 0.3 to 9 ft/day for this aquifer (Brockman, et. al., 1997). The K_h values in the Yorktown-Eastover aquifer were measured between 0.074 and 0.42 ft/day. These values fall within the reported range of 0.004 to 3 ft/day for this aquifer (Brockman, et. al., 1997).

Slug test results, by their nature, are limited in their ability to accurately predict the K_h of an aquifer, in part because of impacts from the filter pack placed around the well during installation. They are generally considered to represent an "order-of-magnitude" level of precision and accuracy in estimating K_h.

3.4.4 Groundwater Flow

Groundwater elevations measured during the RI are presented in **Table 2-2**. Three surface water bodies surround Site 24: Felgates Creek to the west, the York River to the north, and Indian Field Creek to the east. These water bodies influence the groundwater flow direction across the site, and groundwater flow within the wells installed within the Columbia aquifer generally flows toward the closest water body. The potentiometric surface contour map for the Columbia aquifer (**Figure 3-6**) represents the first encountered groundwater beneath Site 24. The groundwater flow in the Yorktown-Eastover aquifer is predominantly to the north, as the deeper, incised York River is a groundwater discharge point for deeper aquifers in the area.

Based on the K_h within the Columbia aquifer (**Section 3.4.3; Table 3-1**), measured at 5.9 ft/day, an assumed effective porosity of 30 percent, and the average horizontal hydraulic gradient calculated from the groundwater contour map (0.025 foot per foot), the average groundwater velocity towards the York River is estimated to be 0.49 ft/day. In addition, since the groundwater at Site 24 is also influenced by Felgates Creek and Indian Field Creek, the average groundwater velocity towards these creeks is estimated to be 0.37 ft/day and 1.2 ft/day, respectively.

TABLE 3-1

Slug Test Results

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Well ID	Test Type/ID	Horizontal Hydraulic Conductivity (ft/day)
GW01 Screen: 30-40 feet bgs	Rising Head #1	0.384
	Falling Head #1	0.418
GW02 Screen: 30-40 feet bgs	Rising Head #1	N/A
	Falling Head #1	0.074
GW10 Screen: 12.5-22.5 feet bgs	Falling Head #1	5.903

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 3\FIGURE3-1_SITELOCATION_GEOLOGY.MXD MUNWIN 7/21/2011 3:52:02 PM

Legend

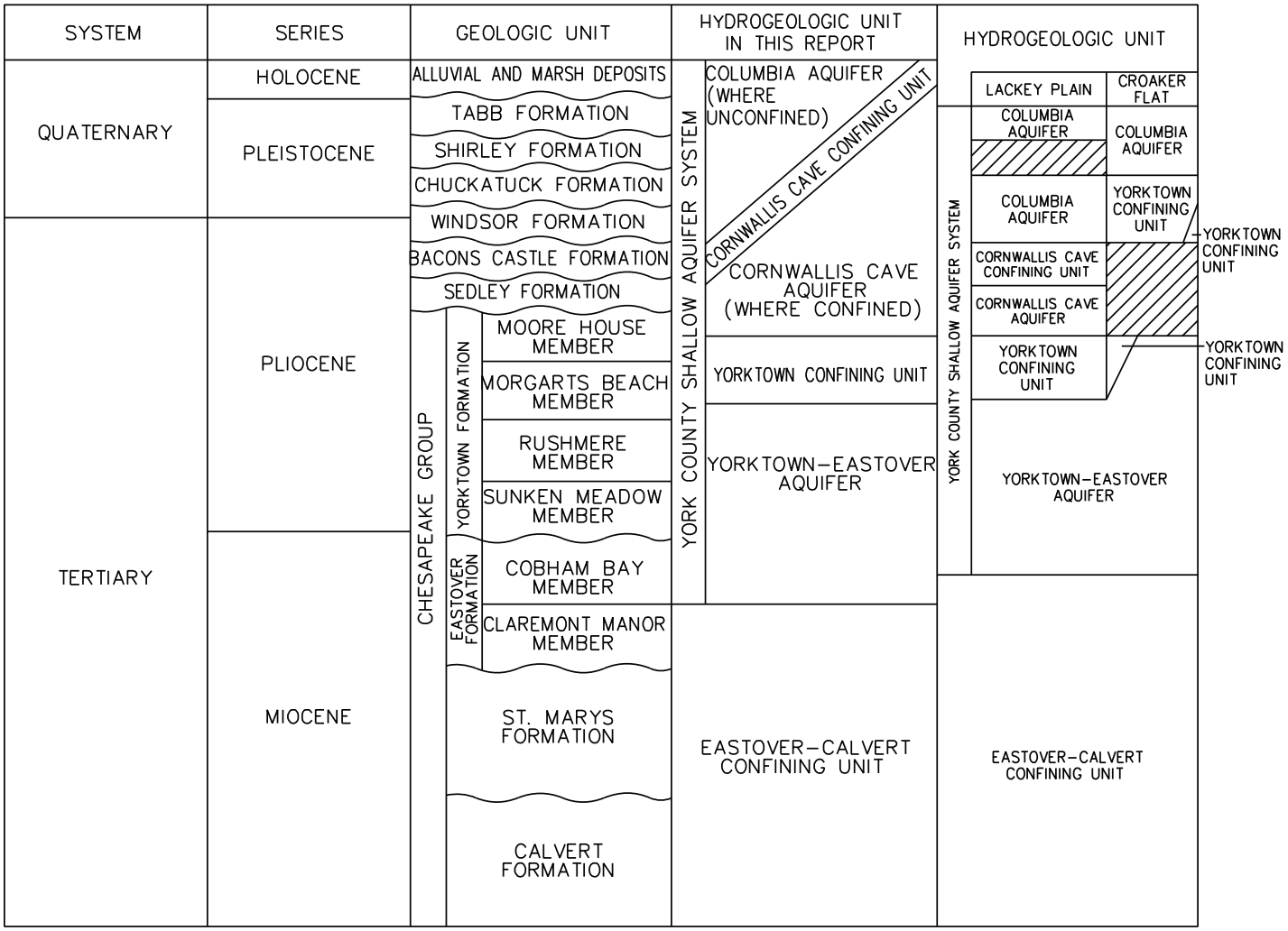
- Naval Weapons Station Boundary
- Generalized Site Boundary
- Camp Peary Scarp
- Elevation Contours (20 ft interval)

N
W E
S

0 750 1,500
Feet

Figure 3-1
Site Location and Major Geologic Features
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

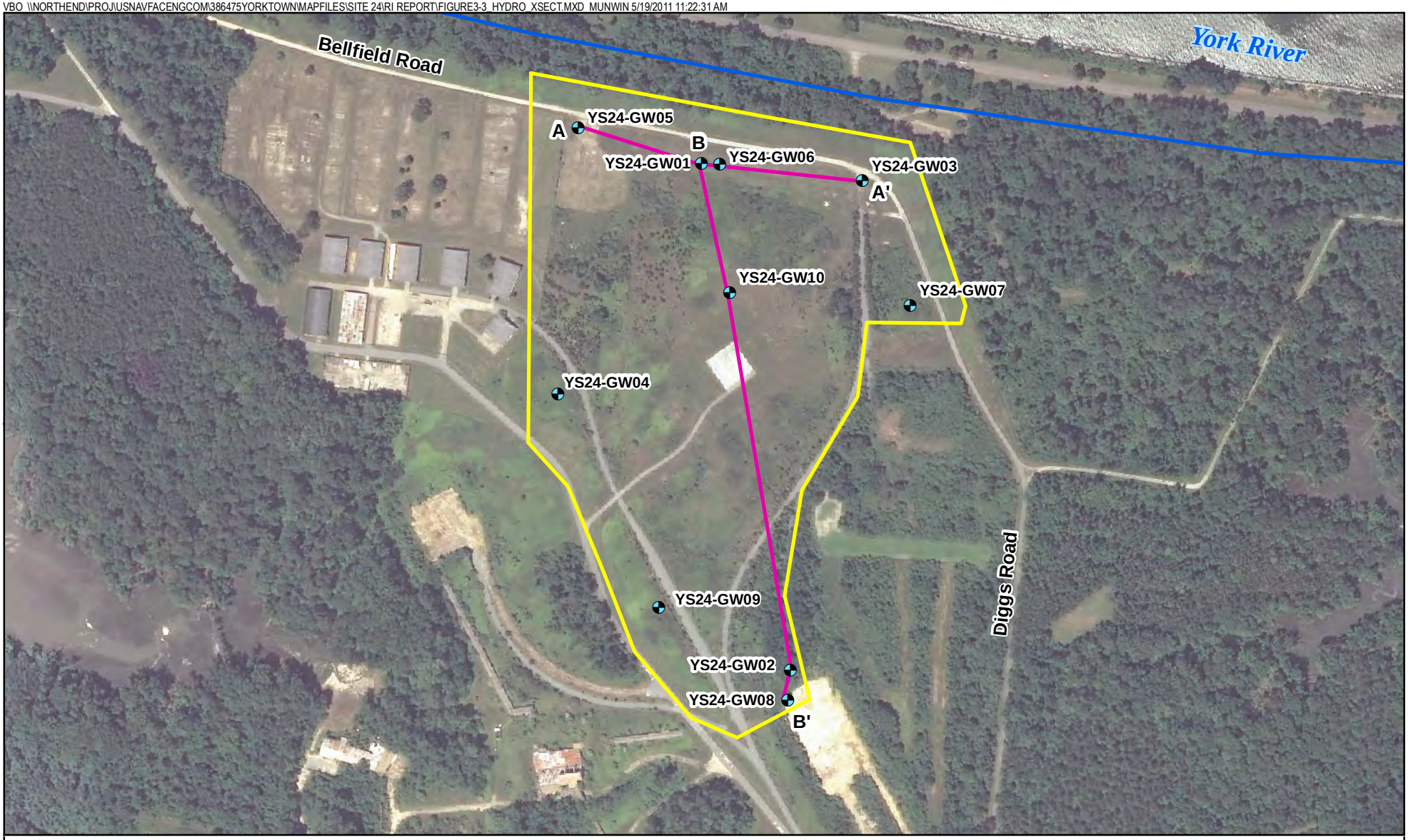


SOURCE: BROCKMAN, ET AL 1997 GEOHYDROLOGY OF THE SHALLOW AQUIFER SYSTEM, NAVAL WEAPONS STATION YOURTOWN, YORKTOWN, VIRGINIA

Figure 3-2
Hydrogeologic Units in York County
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\FIGURE3-3_HYDRO_XSECT.MXD MUNWIN 5/19/2011 11:22:31 AM



Legend

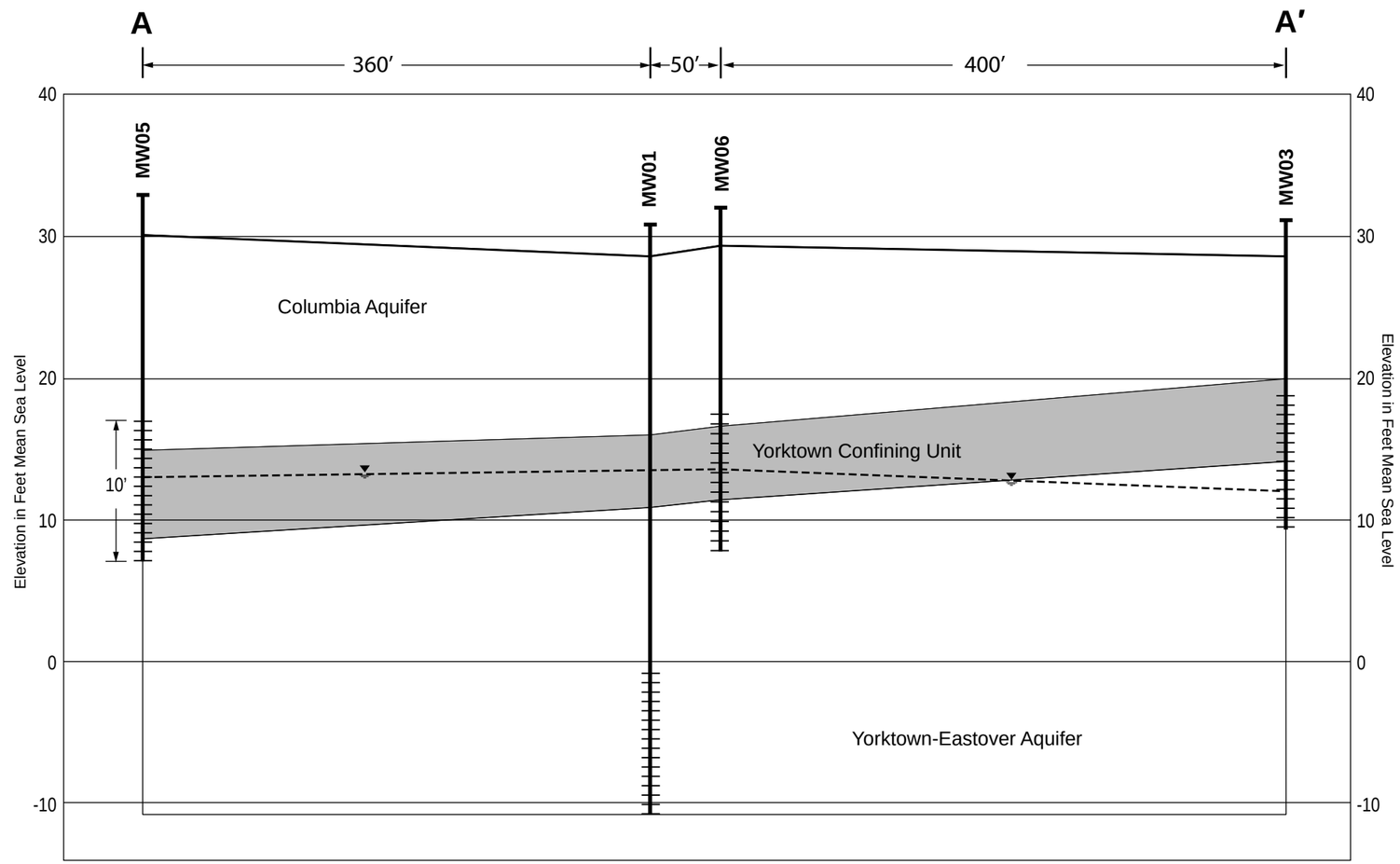
- Monitoring Wells
- Cross Section Locations
- Site 24 Boundary
- Naval Weapons Station Boundary

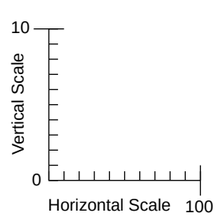
N
W E
S

0 200 400
Feet

Figure 3-3
Location of Hydrogeologic Cross-Sections
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL



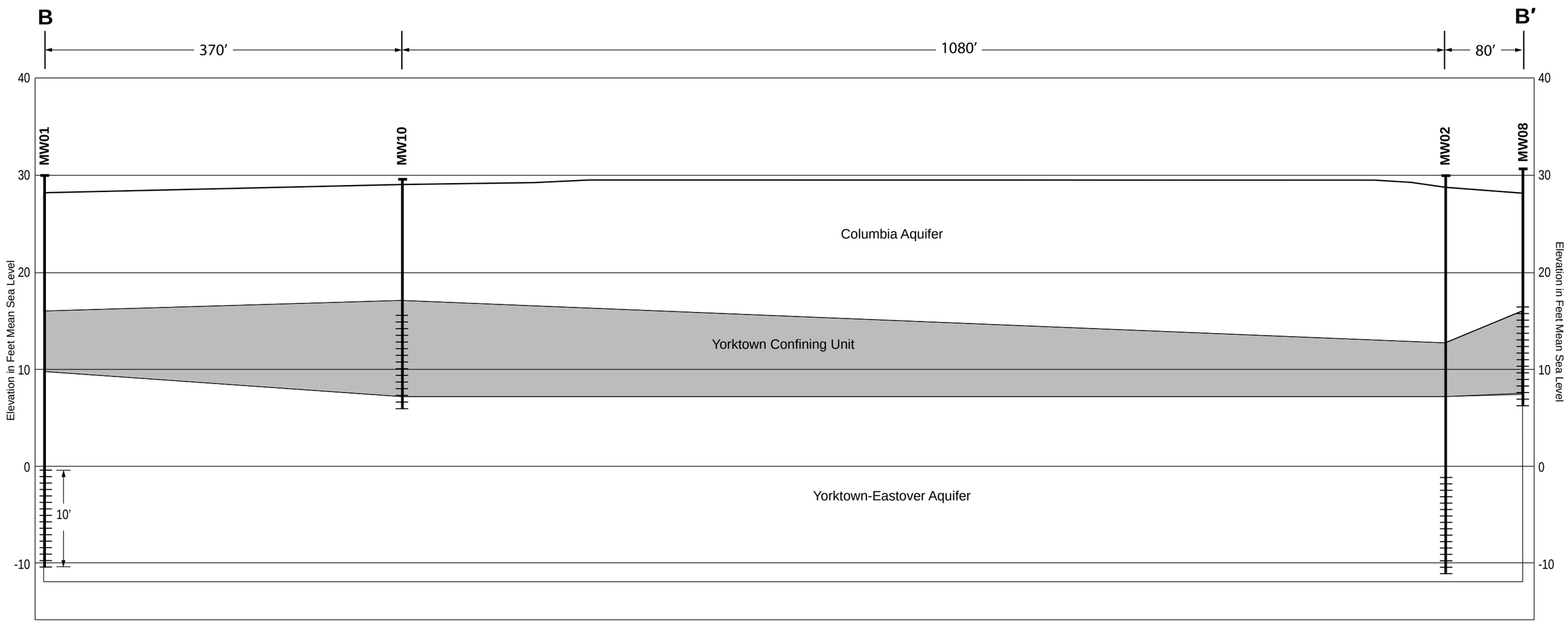


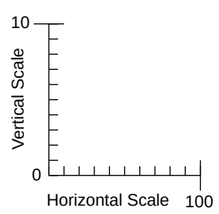
LEGEND

Water Table - Columbia Aquifer

FIGURE 3-4
Cross-Section A-A'
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL





Note: Due to the influence of the different water bodies, the water table has not been included on this figure

FIGURE 3-5
Cross-Section B-B’
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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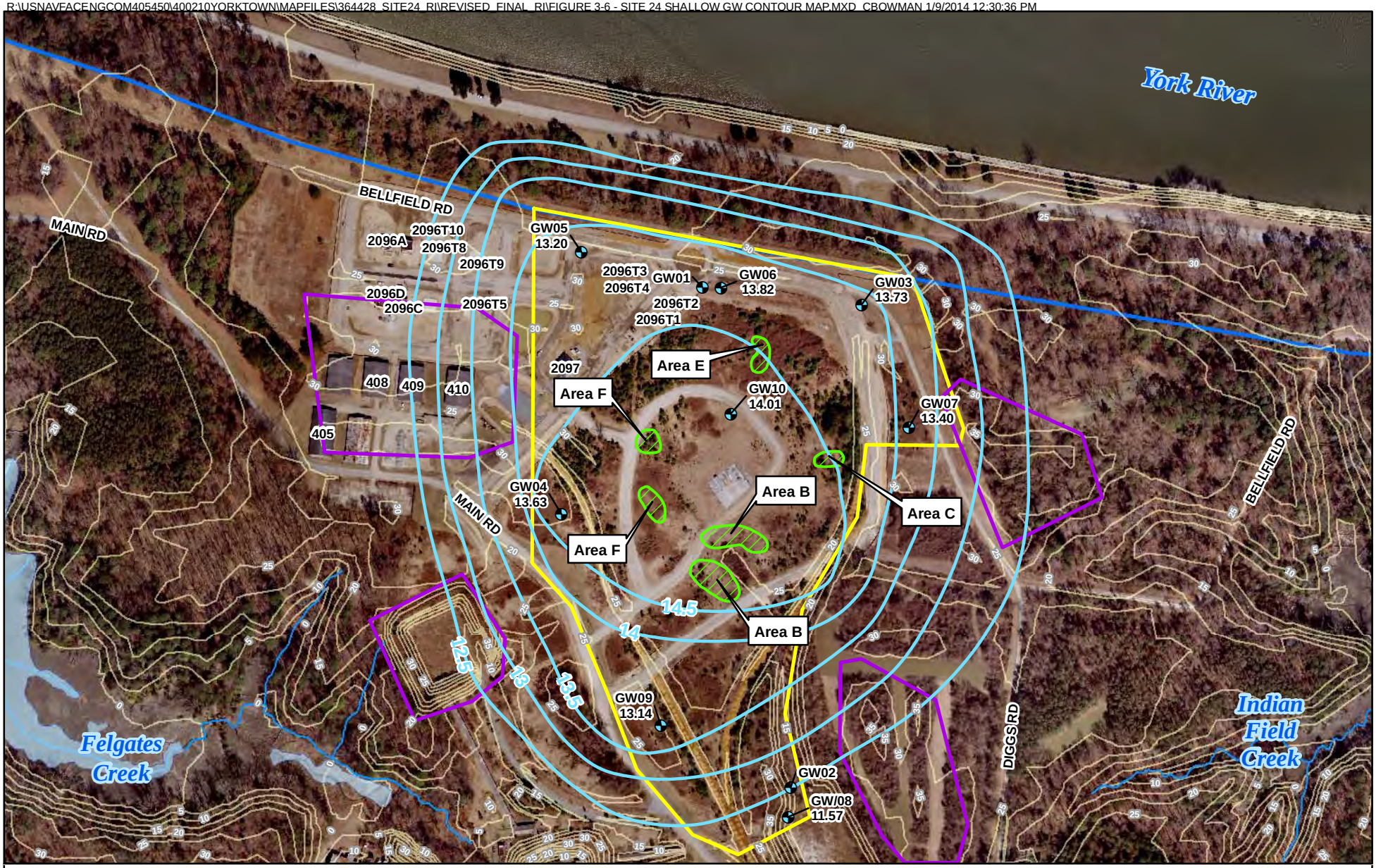
R:\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\REVISED_FINAL_RI\FIGURE 3-6 - SITE 24 SHALLOW GW CONTOUR MAP.MXD CBOWMAN 1/9/2014 12:30:36 PM



Legend

- Monitoring Well
- Groundwater Contour
- Surface Water
- Elevation Contour (5 ft interval)
- Topographic Higher Areas
- Site 24 Investigation Area (former SSA 6 Helicopter Landing Pad)
- Waste Areas
- WPNSTA Boundary

13.73 - Grounwater Elevation

Note:
GW01 and GW02 were not used for contouring because they are screened in the deep aquifer

N
W E
S

0 200 400
Feet

Figure 3-6
Shallow Groundwater Contour Map
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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SECTION 4

Nature and Extent of Contamination

This section presents an evaluation of the nature and extent of contamination within soil located inside and outside the waste boundaries and within groundwater at Site 24. Environmental samples were collected to characterize the vertical and horizontal extent of contamination in order to determine whether remedial action or no action is warranted at Site 24. Environmental samples used in this evaluation were collected during the 1994 SSP, the 1997 RI, and the 2010 RI. In total, 74 test pits, 37 surface soil samples, 43 subsurface soil samples, 11 groundwater samples, and 13 drainage area soil samples were used for this evaluation (**Table 2-1**).

A fundamental understanding of the nature and extent of contamination at Site 24 can facilitate effective decision-making for mitigation of site contamination. The nature and extent of contamination provides critical information to the evaluation of contaminant fate and transport, the potential exposure pathways for risk, and the evaluation and selection of remedial alternatives, if appropriate.

In the initial step of this evaluation, site-specific data were compared to conservative screening values (USEPA Adjusted Residential Regional Screening Levels [RSLs][1], site-specific ecological screening values [ESVs], and in the case of groundwater, maximum contaminant levels [MCLs] and the marine BTAG Screening Values [if available]). If exceedances of these criteria were identified, the data were then compared to the background 95 percent upper tolerance limit (UTL) to determine if the detected concentrations were consistent with the base background concentrations. If the data exceeded the background 95 percent UTL, maximum base background concentrations (CH2M HILL, 2011) were used to determine whether the data could be attributed to a release.

Constituent concentrations used in this evaluation for Site 24 are summarized in **Tables 4-1** through **4-8**. Laboratory analytical reports are included in **Appendix K**.

4.1 Buried Debris

In total, 74 test pits (**Figure 4-1**) were excavated during the 1994 SSP field activities (A06TP01 through A06TP07) and the 2010 RI field activities (TP100 through TP146, B1, B2, B3, C1, E1 through E5, F1, F2, and SB10 through SB20). The test pits were excavated to delineate the horizontal and vertical extent of buried debris within four magnetic anomalies (Areas B, C, E, and F [**Figure 1-3**]) identified during the 1994 geophysical survey (Baker, 1994). In addition, due to the potential that historical burning of explosives-contaminated waste and other base waste may have occurred at the site, the test pitting activities were conducted to confirm the absence or presence of ash within the four major disposal areas. Buried debris was identified in two separate buried debris areas of Area B, Area C, Area E, and two separate areas of Area F (**Figure 4-2**).

During the 1994 SSP field activities, buried debris was identified in Areas B, C, E, and F. In Area B, miscellaneous metal debris, at a maximum depth of 13 feet bgs, was observed in the northern debris area and inert ordnance debris, detonating/activating devices, and rocket motor casings, at a maximum depth of 4½ feet bgs, were observed in the southern debris area. In Area C, a small area of metal banding was observed between the ground surface and 3 feet bgs. In Area E, metal debris was observed between the ground surface and 6 feet bgs. In Area F, metal piping at a maximum depth of 2 feet bgs was observed in the northern debris area, and miscellaneous metal debris, at a maximum depth of 4 feet bgs was observed in the southern debris area.

During the 2010 RI field activities, buried debris was identified in Areas B, E, and F. No additional debris was observed in Area C during these activities. In Area B, miscellaneous metal debris, between 2 and 1 feet bgs, was observed in the northern debris area, and miscellaneous metals debris and two oil cans, between the ground surface and 8 feet bgs, were observed in the southern debris area. In Area E, three 55-gallon drums and other metal debris were observed between the ground surface and 7 feet bgs. In Area F, miscellaneous metal debris was observed in the top 1 foot of the southern debris area. It should be noted that the inert ordnance debris,

[1] The RSLs for carcinogens were not adjusted for those constituents that pose potential cancer risks while the RSLs for non-carcinogens were adjusted by dividing by 10 to account for multiple chemicals contributing to potential non-cancer risks.

detonating/activating devices, and rocket motor casings identified in the northern debris area of Area B were not detected during the 2010 RI field activities.

The results of the test pitting activities indicate that the extent of buried debris within Areas B, C, E, and F have been delineated and that the buried debris is not as extensive as potentially indicated by the results of the 1994 geophysical survey (**Figure 4-2**). In addition, no ash was observed within any of the test pits.

4.2 Soil

In total, 37 surface soil and 43 subsurface soil samples were collected from Site 24 (**Figure 4-3**) during the SSP (A06SS06 through A06SS17, A06SB03 through A06SB06, A06SB10, and A06TP01 through A06TP06), the 1997 RI field activities (24SS01 and 24SS05), and the 2010 RI field activities (YS24-SS01 through YS24-SS21 and YS24-SB01 through YS24-SB20).

Soil samples collected from Site 24 were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives, inorganic constituents, and cyanide.

4.2.1 Surface Soil

Surface soil samples were collected to characterize the nature and extent of contamination inside and outside the buried debris boundaries (**Figure 4-4**), to characterize the nature and extent of contamination within the sludge area (Disposal Area D) (**Figure 4-4**), and to assess the potential risk associated with this medium.

4.2.1.1 Inside Buried Debris Boundaries

Nine surface soil samples (A06TP01, A06TP03 through A06TP05, A06SS06, A06SS08, YS24-SS14, YS24-SS15, and YS24-SS20) were collected from inside the buried debris boundaries (**Figure 4-5** and **Table 4-1**). The surface soil samples within the buried debris boundary were collected to characterize the nature and extent of surface soil contamination associated with the buried debris and to assess the potential risk associated with this medium.

Organic Constituents

Only one SVOC (benzo[a]pyrene) and one PCB (Aroclor-1254) were detected in surface soil samples within the boundary of the buried debris at concentrations exceeding their respective residential RSLs (**Figure 4-5**); however, these constituents did not exceed their respective ESVs.

- Benzo(a)pyrene was detected at a concentration (40J micrograms per kilogram [µg/kg]) that exceeded the residential RSL (15 µg/kg) in one surface soil sample (A06SS06 [0 to 0.5 foot bgs]). However, this detected concentration is below the maximum base background concentration (340J µg/kg) and is therefore likely attributable to anthropogenic conditions unrelated to CERCLA site release.
- Aroclor-1254 was detected at a concentration (590 µg/kg) that exceeded the residential RSL (110 µg/kg) in one surface soil sample (A06TP03 [0 to 4 feet bgs]). A06TP03 is located within the southern debris subarea of Disposal Area B; therefore, this exceedance may be attributable to a release from debris within this subarea.

No other organic constituents (VOCs, SVOCs, pesticides, PCBs, or explosives) were detected in surface soil samples inside the buried debris boundaries at concentrations above their respective screening criteria.

Inorganic Constituents

Eleven inorganic constituents (aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, mercury, selenium, and zinc) exceeded at least one screening criterion in surface soil inside the buried debris boundaries (**Figure 4-5**).

- Aluminum, arsenic, cobalt, and iron were detected in several surface soil samples within the buried debris boundary above their respective adjusted residential RSLs[2] and ESVs, at maximum concentrations of 11,600 mg/kg, 5.6 mg/kg, 6 mg/kg, and 11,000 mg/kg, respectively. These maximum concentrations did not exceed the background 95 percent UTL for these inorganic constituents (aluminum – 12,200 mg/kg; arsenic –

[2] Arsenic is evaluated as a carcinogenic inorganic; therefore, the RSL was not adjusted for comparison purposes.

6.36 mg/kg; cobalt – 9.93 mg/kg; and iron - 19,900 mg/kg) and are therefore likely attributable to naturally occurring or widespread anthropogenic conditions unrelated to site activities.

- Chromium was detected in several surface soil samples within the buried debris boundary above the residential RSL (0.29 mg/kg) but below the ESV (64.0 mg/kg). With the exception of surface soil sample A06TP03, these concentrations did not exceed the background 95 percent UTL (18.2 mg/kg). However, the chromium concentration detected in A06TP03 (20.6 mg/kg) is below the maximum base background concentration (43.2 mg/kg). Therefore, the detected chromium is likely attributable to naturally occurring or widespread anthropogenic conditions unrelated to site activities.
- Cadmium was detected in one surface soil sample within the buried debris boundary, A06TP03, at a concentration of 786 mg/kg. This detected concentration exceeds the adjusted residential RSL (7 mg/kg), the ESV (32.0 mg.kg), and the maximum base background concentration (1.5 mg/kg). Due to the depth range of this sample (0 to 4 feet bgs), these concentrations may be attributable to a release from buried debris observed at this location (inert ordnance debris, detonating/activating devices, and rocket motor casings). However, the cadmium concentrations decrease with depth, as indicated by the analytical results of this metal in the co-located subsurface soil sample (51.9 mg/kg).
- Copper, lead, and zinc were detected above their respective screening criteria and background 95 percent UTL in one surface soil sample within the buried debris boundary, A06TP03. Copper was detected above the ESV (70.0 mg/kg) and the background 95 percent UTL (4.25 mg/kg) at a concentration of 74.4 mg/kg. Lead was detected above the ESV (120 mg/kg) and the background 95 percent UTL (17.4 mg/kg) at a concentration of 344 mg/kg. Zinc was detected above the ESV (120 mg/kg) and the background 95 percent UTL (26.5 mg/kg) at a concentration of 1,190 mg/kg. Due to the depth range of this sample (0 to 4 feet bgs), these concentrations may be attributable to a release from buried debris observed at this location (inert ordnance debris, detonating/activating devices, and rocket motor casings). However, concentrations of these metals decrease with depth, as indicated by the analytical results of these metals in the co-located subsurface soil sample (copper, lead, and zinc – all non-detect).
- Mercury was detected in two surface soil samples within the buried debris boundary, A06TP03 and SS20, above the ESV (0.10 mg/kg) and the background 95 percent UTL (0.11 mg/kg) at concentrations of 1.3 mg/kg and 0.25 mg/kg, respectively. Due to the depth range of surface soil sample A06TP03 (0 to 4 feet bgs), this mercury concentration may be attributable to a release from buried debris observed at this location (inert ordnance debris, detonating/activating devices, and rocket motor casings). At this location, however, mercury concentrations decrease with depth, as it was not detected in the co-located subsurface soil sample. The mercury concentration detected in surface soil sample SS20 was, however, only slightly above the maximum base background concentration (0.24 mg/kg) and may be attributable to background conditions.
- Selenium was detected in one surface soil sample within the buried debris, A06SS08, at a concentration of 0.62 mg/kg. While this detection is above the ESV of 0.52 mg/kg and the background 95 percent UTL of 0.51 mg/kg, the detected concentration is below the maximum base background concentration (2.7 mg/kg); therefore, the detected selenium is likely attributable to naturally occurring or widespread anthropogenic conditions unrelated to site activities.

4.2.1.2 Outside Buried Debris Boundaries

Twenty-eight surface soil samples (A06SS07, A06SS09 through A06SS17, 24SS01, 24SS05, YS24-SS01 through YS24-SS08, YS24-SS11, YS24-SS12, YS24-SS13, YS24-SS16 through YS24-SS19, and YS24-SS21) were collected from outside the buried debris boundaries (**Figure 4-6** and **Table 4-2**). The surface soil samples outside the buried debris boundary were collected to characterize the nature and extent of contamination outside the buried debris boundaries and to assess the potential risk associated with this medium.

Organic Constituents

Only one SVOC (benzo(a)pyrene) and two pesticides (alpha-chlordane and gamma-chlordane) were detected in surface soil samples outside the boundaries of the buried debris at concentrations exceeding at least one screening criterion (**Figure 4-6**).

- Benzo(a)pyrene was detected in eight surface soil samples above its residential RSL (15 µg/kg) at a maximum concentration of 140J µg/kg. However, these detected concentrations are below the maximum base background concentration (340J µg/kg) and are therefore likely attributable to anthropogenic conditions unrelated to a CERCLA release.
- Alpha-chlordane and gamma-chlordane were detected in one surface soil sample, A06SS11, above their respective ESVs (11.0 µg/kg for both) at concentrations of 74 J µg/kg and 76 µg/kg, respectively.

No other organic constituents were detected in surface soil samples outside the buried debris boundaries at concentrations above their respective screening criteria.

Inorganic Constituents

Nine inorganic constituents (aluminum, arsenic, chromium, cobalt, copper, iron, manganese, mercury, and selenium) exceeded at least one screening criterion in surface soil outside the buried debris boundaries (**Figure 4-6**).

- Aluminum, cobalt, and iron were detected in several surface soil samples above their respective adjusted residential RSLs and ESVs, at maximum concentrations of 9,980 mg/kg, 8.7 mg/kg, and 14,100 mg/kg, respectively. These maximum concentrations did not exceed their respective background 95 percent UTLs (aluminum – 12,200 mg/kg; cobalt – 9.93 mg/kg; and iron – 19,900 mg/kg). These constituents are likely attributable to naturally occurring conditions.
- Arsenic was detected in most surface soil samples above the residential RSL of 0.39 mg/kg. However, with the exception of one surface soil sample, SS04, these arsenic concentrations did not exceed the background 95 percent UTL of 6.36 mg/kg and are likely attributable to naturally occurring conditions. In surface soil sample SS04, arsenic was detected at a concentration of 70.4 mg/kg. This concentration exceeds both the residential RSL (0.39 mg/kg) and the ESV (18.0 mg/kg) and may be attributable to a release.
- Chromium was detected in most surface soil samples above the residential RSL of 0.29 mg/kg. With the exception of one surface soil sample, SS08, these concentrations did not exceed the background 95 percent UTL (18.2 mg/kg). However the chromium concentration detected in soil sample SS08 (18.4 mg/kg) is below the maximum base background concentration (43.2 mg/kg) and is likely attributable to naturally occurring or widespread anthropogenic conditions unrelated to site use.
- Copper was detected in one surface soil sample above the ESV (70.0 mg/kg) and the background 95 percent UTL (4.25 mg/kg) in sample A06SS11 at a concentration of 139 mg/kg. A06SS11 is located just outside the extent of buried debris in Disposal Area E, and the copper concentration may be attributable to a release.
- Manganese was detected in one surface soil sample, SS12, above the adjusted residential RSL (180 mg/kg), the ESV (220 mg/kg), and the background 95 percent UTL (324 mg/kg), at a concentration of 963 mg/kg. Surface soil sample SS12 is located along the edge of one of the site drainage swales, and the manganese concentration may be attributable to a release.
- Mercury was detected in one surface soil sample, A06SS11, above the adjusted residential RSL (2.3 mg/kg), the ESV (0.10 mg/kg), and the background 95 percent UTL (0.11 mg/kg), at a concentration of 4.7 mg/kg. A06SS11 is located just outside the extent of buried debris in Disposal Area E, and the mercury concentration may be attributable to a release from this disposal area.
- Selenium was detected in three surface soil samples above the ESV (0.52 mg/kg), surface soil samples A06SS11, A06SS12, and A06SS14, at concentrations of 0.66K mg/kg, 0.78K mg/kg, and 0.58K mg/kg, respectively. While these concentrations exceeded the background 95 percent UTL (0.51 mg/kg), they did not

exceed the maximum base background concentration (2.7 mg/kg) and are likely attributable to naturally occurring or widespread anthropogenic conditions.

4.2.1.3 Sludge Area

Two surface soil samples (YS24-SS09 and YS24-SS10) were collected from within the sludge area (**Figure 4-7** and **Table 4-3**). The surface soil samples were collected to characterize the nature and extent of contamination within the sludge area (Disposal Area D) and to assess the potential risk associated with this medium.

No VOCs, SVOCs, pesticides, PCBs, or explosives were detected at concentrations exceeding their respective screening criteria. Three inorganic constituents, chromium, cobalt, and manganese, were detected at maximum concentrations (6.2 mg/kg, 8.7 mg/kg, and 245 mg/kg, respectively) that exceeded their respective adjusted residential RSLs[3] (chromium – 0.29 mg/kg; cobalt – 2.3 mg/kg; and manganese – 180 mg/kg) (**Figure 4-7**). However, these concentrations were below their respective background 95 percent UTLs (18.2 mg/kg, 9.93 mg/kg, and 324 mg/kg, respectively) and are likely attributable to naturally occurring or widespread anthropogenic conditions.

4.2.2 Subsurface Soil

Subsurface soil samples were collected and analyzed to characterize the nature and extent of contamination inside and outside the buried debris boundaries (**Figure 4-8**) and within the sludge area (Disposal Area D) (**Figure 4-8**), to characterize the nature and extent of contamination of the buried waste, and to assess any potential human health or environmental risk.

In addition, during the excavation of one test pit, TP121, an abandoned, non-pressurized waterline was inadvertently cracked, and the contents of the pipe spilled into the test pit. As a result, a soil sample from immediately below the pooling water was collected to determine if subsurface soil had been impacted by the contents of the cracked waterline and to assess potential risk to human health and the environment, if necessary.

4.2.2.1 Inside Buried Debris Boundary

Three soil debris samples (AS06TP02, AS06TP06, and SB20B) and nine subsurface soil samples (AS06TP01 through AS06TP06, SB14, SB15, and SB20) were collected from inside the buried debris boundaries (**Figures 4-9** and **4-10** and **Table 4-4**).

Soil Debris Samples

The soil debris samples were collected in order to determine the extent of soil contamination within the debris, to characterize vertical migration and potential accumulation of contaminants within the buried debris, and to assess potential risk to human health and the environment.

Organic Constituents

Two PCBs, Aroclor-1254 and Aroclor-1260, were detected in one soil debris sample, A06TP02 (1 to 9 feet bgs), collected from within the buried debris where miscellaneous metal debris was encountered at concentrations exceeding at least one screening criterion (**Figure 4-9**).

Aroclor-1254 was detected above the residential RSL (110 µg/kg) at a concentration of 770J µg/kg, and Arolcor-1260 was detected above the residential RSL (220 µg/kg) at a concentration of 340 µg/kg. Based on the depth of the Aroclor-1254 and Aroclor-1260 detections, these concentrations may be attributable to a release from buried debris within this subarea of Disposal Area B, where the most extensive buried debris was identified.

No other organic constituents (VOCs, SVOCs, pesticides, or explosives) were detected in soil debris samples inside the buried debris boundaries at concentrations above their respective screening criteria.

[3] Chromium is evaluated as a carcinogenic inorganic; therefore, the RSL was not adjusted for comparison purposes.

Inorganic Constituents

Eight inorganic constituents (aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, and manganese) were detected in soil debris samples collected from within the buried debris (**Figure 4-9**).

- Arsenic, cobalt, and iron were detected in soil debris samples within the buried debris above their respective adjusted residential RSLs[4], at maximum concentrations of 4.5 mg/kg, 3.8 mg/kg, and 21,300 mg/kg. However, these maximum concentrations did not exceed the background 95 percent UTLs for these inorganic constituents (arsenic – 5.54 mg/kg; cobalt – 5.18 mg/kg; iron – 32,000 mg/kg) and are likely attributable to naturally occurring conditions.
- Aluminum was detected in one soil debris sample, SB20B, above the adjusted residential RSL (7,700 mg/kg) and the background 95 percent UTL (13,000 mg/kg) at a concentration of 344,000 mg/kg. Due to the debris encountered at this location (drums and metal pallets), this aluminum concentration is likely attributable to a release.
- Cadmium was detected in one soil debris sample, A06TP02, above the adjusted residential RSL of 7 mg/kg at a concentration of 101 mg/kg. Since no background concentration exists for cadmium, and as no cadmium was detected in any subsurface soil sample outside the buried debris boundaries, this concentration may be attributable to a release from buried debris within Area B.
- Chromium was detected above the residential RSL of 0.29 mg/kg in all three soil debris samples. However, with the exception of soil debris sample SB20B, these chromium concentrations did not exceed the background 95 percent UTL of 33.7 mg/kg. In soil debris sample SB20B, chromium was detected at a concentration of 64.6 mg/kg. Due to the debris encountered at this location (drums and metal pallets), the chromium concentration in SB20B may be attributable to a release.
- Copper and manganese were detected in one soil debris sample, SB20B, above their respective adjusted residential RSLs (310 mg/kg and 180 mg/kg) and their respective background 95 percent UTLs (3.17 mg/kg 176 mg/kg) at concentrations of 15,500 mg/kg and 2,860 mg/kg, respectively. Due to the debris encountered at this location (rusted, damaged drums and metal pallets), the copper and manganese concentrations may be attributable to a release.

Subsurface Soil Samples

The subsurface soil samples were collected from below buried debris within Debris Disposal Areas B, C, E, and F in order to determine the extent of deep subsurface soil contamination, to characterize vertical migration and potential accumulation of contaminants below the buried debris, and to assess potential risk to human health.

Debris Disposal Area B

Six organics (n-Nitroso-di-n-propylamine, alpha-benzene-hexachloride (BHC), Aroclor-1254, Aroclor-1260, dieldrin, and heptachlor) and seven inorganic constituents (aluminum, arsenic, barium, cadmium, chromium, cobalt, and iron) were detected above their respective adjusted residential RSL[5] in the deep subsurface soil samples collected from Debris Disposal Area B (**Figure 4-10**).

- n-Nitroso-di-n-propylamine was detected in subsurface soil sample A06TP03 above the residential RSL (69 µg/kg) at a concentration of 93J µg/kg. The n-nitroso-di-n-propylamine concentration may be attributable to a release from the buried debris within the southern subarea of Disposal Area B.
- Alpha-BHC and heptachlor were detected in one subsurface soil sample, SB14, above their respective residential RSLs (77 µg/kg and 110 µg/kg) at concentrations of 460 µg/kg and 200 µg/kg, respectively. Based on the depth of the detections (10 to 11 feet bgs), the alpha-BHC and heptachlor may be attributable to a

[4] Arsenic is evaluated as a carcinogenic inorganic; therefore, the RSL was not adjusted for comparison purposes.

[5] Arsenic and chromium are evaluated as carcinogenic inorganics; therefore, the RSL was not adjusted for comparison purposes.

release from buried debris within the northern subarea of Disposal Area B, where the most extensive buried debris was identified.

- Aroclor-1254 was detected in three subsurface soil samples, A06TP02, A06TP03, and SB14, above the residential RSL (110 µg/kg) at concentrations of 12,000J µg/kg, 79,000 µg/kg, and 5,100 µg/kg, respectively. Based on the depth of these detections (9 to 10 feet bgs, 4 to 4.5 feet bgs, and 10 to 11 feet bgs, respectively), the Aroclor-1254 concentrations are likely attributable to a release from buried debris within both subareas of Disposal Area B.
- Arolcor-1260 was detected in two subsurface soil samples, A06TP02 and SB14, above the residential RSL (220 µg/kg) at concentrations of 4,900 µg/kg and 590 µg/kg, respectively. Based on the depth of these detections (9 to 10 feet bgs and 10 to 11 feet bgs, respectively), the Aroclor-1260 concentrations are likely attributable to a release from buried debris within the northern subarea of Disposal Area B, where the most extensive buried debris was identified.
- Dieldrin was detected in one subsurface soil sample, A06TP02, above the residential RSL (30 µg/kg) at a concentration of 90J µg/kg. Based on the depth of this detection (9 to 10 feet bgs), the dieldrin concentration may be attributable to a release from buried debris within the northern subarea of Disposal Area B, where the most extensive buried debris was identified.
- Barium and iron were detected in subsurface soil samples within the buried debris boundaries above their respective adjusted residential RSLs (1,500 mg/kg and 5,500 mg/kg, respectively), at maximum concentrations of 27.7 mg/kg and 21,300 mg/kg, respectively. However, these maximum concentrations did not exceed the background 95 percent UTLs for these inorganic constituents (barium – 84.5 mg/kg; iron – 32,000 mg/kg) and are likely attributable to naturally occurring conditions.
- Aluminum was detected in three subsurface soil samples, AS06TP03, SB14 and SB15, above the adjusted residential RSL (7,700 mg/kg) at concentrations of 9,270 mg/kg, 13,200 mg/kg, and 14,500 mg/kg, respectively. However these concentrations did not exceed the maximum base background concentration (18,400 mg/kg) and are likely attributable to naturally occurring conditions.
- Arsenic was detected in three subsurface soil samples, A06TP02, A06TP03, and SB15, above the residential RSL of 0.39 mg/kg. However, with the exception of one subsurface soil sample, A06TP02, these arsenic concentrations did not exceed the background 95 percent UTL of 5.54 mg/kg. In subsurface soil sample A06TP02, arsenic was detected at a concentration of 5.6 mg/kg, which is consistent with the background 95 percent UTL and is likely attributable to naturally occurring conditions.
- Cadmium was detected in three subsurface soil samples, A06TP02, A06TP03, and SB14, at concentrations greater than the adjusted residential RSL of 7 mg/kg, with a maximum concentration of 575 mg/kg in subsurface soil sample SB14. These three subsurface soil samples were collected from both subareas of Area B. Since no background concentration exists for cadmium, and because cadmium was not detected in any subsurface soil sample outside the buried debris boundaries, these detected concentrations are likely attributable to a release from buried debris within Area B.
- Chromium was detected above the residential RSL of 0.29 mg/kg in all subsurface soil samples within Debris Disposal Area B. However, with the exception of one subsurface soil sample, SB15, these chromium concentrations did not exceed the background 95 percent UTL of 33.7 mg/kg. In subsurface soil sample SB15, chromium was detected at a concentration of 45.6 mg/kg. Due to the debris encountered at SB15 (metal debris), the chromium exceedance may be attributable to a release.
- Cobalt was detected in three subsurface soil samples, A06TP02, A06TP03, and SB14, above the adjusted residential RSL of 2.3 mg/kg. However, with the exception of one subsurface soil sample, A06TP03, these cobalt concentrations did not exceed the background 95 percent UTL of 5.18 mg/kg. In subsurface soil sample A06TP03, cobalt was detected at a concentration of 7.9 mg/kg, which is consistent the maximum base background concentration (7.3 mg/kg) and is likely attributable to naturally occurring conditions.

No other constituents were detected in subsurface soil samples within the Disposal Area B boundaries at concentrations above their respective screening criteria.

Debris Disposal Area C Two inorganic constituents (arsenic and chromium) were detected above their respective residential RSLs (0.39 mg/kg and 0.29 mg/kg, respectively) in the one deep subsurface soil sample collected from Debris Disposal Area C (A06TP01) (**Figure 4-10**). While arsenic was detected at a concentration of 0.79K mg/kg, and chromium was detected at a concentration of 5.6L mg/kg, these concentrations did not exceed their respective background 95 percent UTL (5.54 mg/kg and 33.7 mg/kg) and are likely attributable to naturally occurring conditions.

No other constituents were detected in subsurface soil samples within the Disposal Area C boundaries at concentrations above their respective screening criteria.

Debris Disposal Area E Two inorganic constituents (arsenic and chromium) were detected above their respective residential RSLs (0.39 mg/kg and 0.29 mg/kg) in deep subsurface soil sample collected from A06TP06. Chromium was detected above the residential RSL in deep subsurface soil sample collected from YS24-SB20 (**Figure 4-10**).

While arsenic was detected at a concentration of 1.4 mg/kg (A06TP06), and chromium was detected at concentrations of 5.8 mg/kg (A06TP06) and 10.7 mg/kg (YS24-SB20), these concentrations did not exceed their respective background 95 percent UTLs (5.54 mg/kg and 33.7 mg/kg), and are likely attributable to naturally occurring conditions.

No other constituents were detected in subsurface soil samples within the Disposal Area E boundaries at concentrations above their respective screening criteria.

Debris Disposal Area F Two organic compounds (2,4-dinitrotoluene [DNT] and 2,4,6-TNT) and two inorganic constituents (arsenic and chromium) were detected above their respective residential RSL in the deep subsurface soil samples collected from Debris Disposal Area F (**Figure 4-10**).

- 2,4-DNT was detected in subsurface soil sample A06TP05 above the residential RSL (1,600 µg/kg) at a concentration of 2,100J µg/kg. The 2,4-DNT concentration may be attributable to a release from the buried debris within the northern subarea of Disposal Area F.
- 2,4,6-TNT was detected in subsurface soil sample A06TP05 above the residential RSL (3,600 µg/kg) at a concentration of 4,100J µg/kg. The 2,4,6-TNT concentration may be attributable to a release from the buried debris within the northern subarea of Debris Disposal Area F.
- Arsenic and chromium were detected in both subsurface soil samples collected from Disposal Area F, A06TP04 and A06TP05, above their respective residential RSLs (0.39 mg/kg and 0.29 mg/kg). However, the detected arsenic (1.1K mg/kg [A06TP04] and 1.7 mg/kg [A06TP05]) and chromium (4.3L mg/kg [A06TP04] and 7.7 mg/kg [A06TP05]) concentrations did not exceed their respective background 95 percent UTLs (5.54 mg/kg and 33.7 mg/kg), and are likely attributable to naturally occurring conditions.

No other constituents were detected in subsurface soil samples within the Disposal Area F boundaries at concentrations above their respective screening criteria.

4.2.2.2 Outside Buried Debris Boundary

Eight shallow subsurface soil samples (YS24-SB01 through YS24-SB08), eight deep subsurface soil samples (YS24-SB10 through YS24-SB13 and YS24-SB16 through YS24-SB19), and one deep test pit subsurface soil sample (TP121) were collected from outside the buried debris boundaries (**Figures 4-11** and **4-12** and **Table 4-5**).

Shallow and Deep Subsurface Samples The shallow and deep subsurface soil samples were collected in order to determine the nature and extent of contamination and to assess potential risk to human health and the environment. In addition, the shallow subsurface soil samples were collected to characterize vertical migration and potential accumulation of contaminants from surface soil, while the deep subsurface soil samples were collected to characterize contaminants outside the buried debris, but within the identified magnetic anomalies.

Organic Constituents Three SVOCs (benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene) were detected in only two subsurface soil samples outside the boundaries of the buried debris at concentrations exceeding at least one screening criterion (**Figure 4-11**).

- Benzo(a)pyrene was detected in two subsurface soil samples above the residential RSL (15 µg/kg) at concentrations of 180J µg/kg (YS24-SB04 [0.5 to 2 feet bgs]) and 44J µg/kg (YS24-SB05 [0.5 to 2 feet bgs]).
- Benzo(b)fluoranthene was detected in one subsurface soil sample, YS24-SB04 (0.5 to 2 feet bgs), above the residential RSL (150 µg/kg) at a concentration of 300 µg/kg.
- Dibenz(a,h)anthracene was detected in one subsurface soil sample, YS24-SB04 (0.5 to 2 feet bgs), above the residential RSL (15 µg/kg) at a concentration of 45J µg/kg.

No other organic constituents (VOCs, SVOCs, pesticides, PCBs, or explosives) were detected in subsurface soil samples inside the buried debris boundaries at concentrations above their respective screening criterion.

Inorganic Constituents Seven inorganic constituents (aluminum, antimony, arsenic, chromium, cobalt, iron, and vanadium) exceeded at least one screening criterion in subsurface soil outside the buried debris boundaries (**Figure 4-11**).

- Aluminum was detected in several subsurface soil samples above the adjusted residential RSL (7,700 mg/kg) and ESV (pH less than 5.5), at a maximum concentration of 12,400 mg/kg and a minimum pH of 5.46. However, the maximum aluminum concentration did not exceed the background 95 percent UTLs for aluminum (13,000 mg/kg) and is likely attributable to naturally occurring conditions.
- Chromium was detected in most subsurface soil samples above the residential RSL (0.29 mg/kg), at a maximum concentration of 43.4 mg/kg. This maximum concentration is consistent with the background 95 percent UTL (33.7 mg/kg) and is likely attributable to naturally occurring conditions.
- Antimony was detected in one subsurface soil sample, A06SB05 (11 to 13 feet bgs), above the adjusted residential RSL of 3.1 mg/kg at a concentration of 4.6 mg/kg. There is no base background value for antimony.
- Arsenic was detected in most subsurface soil samples above the residential RSL of 0.39 mg/kg. In addition, arsenic was detected in one subsurface soil sample, YS24-SB04, above the ESV (18.0 mg/kg) and the background 95 percent UTL (5.54 mg/kg). The maximum arsenic concentration was detected in subsurface soil sample SB04 (located within magnetic anomaly Area G) at a concentration of 113 mg/kg and may be attributable to a release.
- Cobalt was detected in several subsurface soil samples above the adjusted residential RSL of 2.3 mg/kg, at a maximum concentration of 12.3 mg/kg. However, with the exception of the maximum cobalt detection A06SB05 (11 to 13 feet bgs), these concentrations did not exceed the maximum base background concentration (7.3 mg/kg).
- Iron was detected in most subsurface soil samples above the adjusted residential RSL of 5,500 mg/kg. In addition, the ecological screening level for iron (5<pH>8) was exceeded in three subsurface soil samples. With the exception of one subsurface soil sample, A06SB05 (11 to 13 feet bgs), these concentrations did not exceed the background 95 percent UTL (32,200 mg/kg). However, the iron concentration in this subsurface soil sample was detected only slightly above the base background value, at a concentration of 35,800 mg/kg; therefore, it is likely attributable to naturally occurring conditions.
- Vanadium was detected above the adjusted residential RSL (39 mg/kg) and background 95 percent UTL (48.3 mg/kg) in two subsurface soil samples, A06SB06 and SB11, at concentrations of 99.3 mg/kg and 65.5 mg/kg, respectively, and may be attributable to a release.

Test Pit Subsurface Sample The one deep test pit subsurface soil sample, YS24-SB121, was collected to characterize the extent of subsurface soil contamination below a cracked waterline and to assess potential risk to human health and the environment.

Organic Constituents No VOCs, SVOCs, pesticides, PCBs, or explosives were detected at concentrations exceeding their respective screening criteria.

Inorganic Constituents Five inorganic constituents, aluminum, chromium, cobalt, iron, and vanadium, exceeded at least one screening criterion in the soil below the cracked waterline (**Figure 4-12**).

- Aluminum was detected above the adjusted residential RSL (7,700 mg/kg) and the background 95 percent UTL (13,000 mg/kg) at a concentration of 20,200 mg/kg.
- Chromium and iron were detected above their respective adjusted residential RSLs[6] at concentrations of 21.7 mg/kg and 21,300 mg/kg, respectively. However, these concentrations did not exceed their background 95 percent UTLs (chromium – 33.7 mg/kg; iron – 32,000 mg/kg) and are likely attributable to naturally occurring conditions.
- Cobalt was detected above the adjusted residential RSL (2.3 mg/kg) and the background 95 percent UTL (5.18 mg/kg) at a concentration of 10.8 mg/kg.
- Vanadium was detected above the adjusted residential RSL (32 mg/kg) and the background 95 percent UTL (48.3 mg/kg) at a concentration of 89.4 mg/kg.

4.2.2.3 Sludge Area

One subsurface soil sample, YS24-GW/SB09, was collected from within the sludge area (**Figure 4-7** and **Table 4-3**). The subsurface soil sample was collected to characterize the nature and extent of contamination within the sludge area (Disposal Area D) and to assess the potential risk associated with this medium.

No organic compounds (VOCs, SVOCs, pesticides, PCBs, or explosives) were detected in this subsurface soil sample. Three inorganic constituents, chromium, cobalt, and iron, were detected at concentrations (6.9 mg/kg, 2.9 mg/kg, and 5,820 mg/kg, respectively) that exceeded their respective adjusted residential RSLs[7] (chromium – 0.29 mg/kg; cobalt – 2.3 mg/kg; and manganese – 180 mg/kg) (**Figure 4-7**). However, these concentrations were below their respective background 95 percent UTLs (18.2 mg/kg, 9.93 mg/kg, and 19,900 mg/kg, respectively), and these detected concentrations are likely attributable to naturally occurring conditions.

4.3 Drainage Soil Samples

Ten drainage soil samples were collected during the 2010 RI field activities (SS22 through SS31) from within the grassy stormwater drainage features identified by USEPA Region 3 BTAG personnel on a site visit held on December 6, 2007 (**Figure 4-13** and **Table 4-6**). The drainage soil samples were collected to characterize the nature and extent of contamination and aid in the assessment of potential risk to soil outside the burial areas. In addition, it was determined that three soil samples (24SS02, 24SS03, and 24SS04) collected during the 1997 RI field activities were also located within these grassy stormwater drainage features.

Drainage soil samples collected from Site 24 were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives, inorganic constituents, and cyanide.

4.3.1 Organic Constituents

Four SVOCs (benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, and dibenz[a,h]anthracene) exceeded at least one screening criterion in drainage soil (**Figure 4-14**).

- Benzo(a)pyrene was detected above the residential RSL of 15 µg/kg in drainage soil samples SS25 (52J µg/kg), SS26 (28J µg/kg), and YS24-SS31 (180J µg/kg). However, these detected concentrations are below the

[6] Chromium is evaluated as a carcinogenic inorganic; therefore, the RSL was not adjusted for comparison purposes.

[7] Chromium is evaluated as a carcinogenic inorganic; therefore, the RSL was not adjusted for comparison purposes.

maximum base background concentration (340J µg/kg) and are therefore likely attributable to widespread anthropogenic conditions unrelated to site activities.

- Benzo(a)anthracene was detected above the residential RSL of 150 µg/kg in drainage soil sample SS31 at a concentration of 160J µg/kg. However, this detected concentration is below the maximum base background concentration (220J µg/kg) and is therefore likely attributable to widespread anthropogenic conditions unrelated to site activities.
- Benzo(b)fluroanthene was detected above the residential RSL of 150 µg/kg in drainage soil sample SS31 at a concentration of 250 µg/kg. However, this detected concentration is below the maximum base background concentration (650J µg/kg) and is therefore likely attributable to widespread anthropogenic conditions unrelated to site activities.
- Dibenz(a,h)anthracene was detected above the residential RSL of 15 µg/kg in drainage soil samples SS31 at a concentration of 45J µg/kg.

No other organic constituents (VOCs, SVOCs, pesticides, PCBs, or explosives) were detected in drainage soil samples at concentrations above their respective screening criterion.

4.3.2 Inorganic Constituents

Five inorganic constituents (aluminum, arsenic, chromium, cobalt, and iron) exceeded at least one screening criterion in drainage soil (**Figure 4-14**).

- Aluminum, cobalt, and iron were detected in several drainage soil samples above their respective adjusted residential RSLs and ESVs at maximum concentrations of 11,900 mg/kg, 5.1 mg/kg, and 15,100 mg/kg, respectively. These maximum concentrations did not exceed the background 95 percent UTLs for these inorganic constituents (aluminum – 12,200 mg/kg; cobalt – 9.93 mg/kg; and iron (19,900 mg/kg) and are likely attributable to naturally occurring conditions.
- Arsenic was detected in seven drainage soil samples above the residential RSL (0.39 mg/kg) and/or ESV (18.0 mg/kg). With the exception of two drainage soil samples, 24SS04 and SS31, these concentrations did not exceed the background 95 percent UTLs (6.36 mg/kg). In drainage soil sample 24SS04, arsenic was detected at a concentration of 9.1 mg/kg, which is consistent with the background 95 percent UTL (6.36 mg/kg) and is likely attributable to naturally occurring conditions. However, in drainage soil sample SS31, arsenic was detected above the maximum background concentration at a concentration of 151 mg/kg and may be attributable to a release.
- Chromium was detected in all drainage soil samples above the residential RSL (0.29 mg/kg). With the exception of drainage soil sample 24SS04, these concentrations did not exceed the background 95 percent UTL (18.2 mg/kg). However, the chromium concentration detected in 24SS04 (24.6J mg/kg) is below the maximum base background concentration (43.2 mg/kg) and is likely attributable to naturally occurring conditions.

4.4 Groundwater

The monitoring well network at Site 24 consists of nine shallow monitoring wells (MW03 through MW11) installed within the Columbia aquifer and two deep monitoring wells (MW01 and MW02) installed within the Yorktown-Eastover aquifer (**Figure 4-15** and **Tables 4-7** and **4-8**). Monitoring wells MW01 through MW10 were installed to characterize the nature and extent of contamination and to assess the potential risk associated with this medium. Although groundwater samples were collected from Site 24 during the SSP, these samples were not used in this evaluation since the groundwater samples were not collected from permanent monitoring wells and are not likely to be representative of current groundwater conditions. In addition, monitoring well GW11 was installed within the Columbia Aquifer to further characterize groundwater quality downgradient of Area B. Based on the concentrations from GW11, the WPNSTA Yorktown Partnering Team agreed that results from this well would only be compared to the conservative screening criteria as discussed in Section 4.4.3 below (i.e., the results were not

included in the evaluation of contaminant fate and transport and not included in the quantitative risk assessments).

Groundwater samples collected from the Site 24 monitoring wells were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives, inorganic constituents (both total and dissolved), and cyanide. In addition, natural attenuation parameters, including the geochemical parameters alkalinity, chloride, nitrate, nitrite, sulfate, sulfide, methane, ethane, and ethene, and TOC, were analyzed from samples collected in four select monitoring wells; the results are summarized in **Table 4-7**. Field measurements were collected during the purging of all monitoring wells, including DO, ORP, pH, temperature, conductivity, and turbidity, and nitrate, nitrite, and sulfide, are summarized in **Table 2-3**.

A summary of the results of the natural attenuation parameters, a discussion of the nature and extent of contamination by aquifer, and a comparison of the groundwater data collected from GW03 through GW10 in 2010 to the groundwater data collected from GW11 in 2013 are presented as follows. A discussion of the significance of each natural attenuation parameter and geochemical conditions within groundwater is presented in **Section 5.**

4.4.1 General Groundwater Geochemistry

Measurements of DO, ORP, pH, temperature, conductivity, and turbidity were collected following purging of all monitoring wells (**Table 2-3**). The DO readings collected during purging activities ranged between 3.45 milligrams per liter (mg/L) and 10.87 mg/L and were slightly lower in the deeper aquifer (Yorktown-Eastover). ORP values ranged between -129 millivolts (mV) and 174 mV and were lower in the deeper aquifer (Yorktown-Eastover). pH values ranged between 6.73 and 9.34, and temperature readings ranged between 15.5 degrees Celsius (°C) and 19.7 °C. Conductivity values, which provide an indication of the total dissolved solids within groundwater, ranged between 0.0485 milliSiemen per centimeter (mS/cm) and 0.952 mS/cm, which are indicative of freshwater conditions. Further details regarding groundwater geochemistry and its applicability to fate and transport are discussed in **Section 6.2**.

4.4.2 Shallow Groundwater from 2010

Samples of shallow groundwater were collected from GW03 through GW10 in 2010 in order to determine the nature and extent of contamination within the shallow aquifer (Columbia) and the analytical results from GW03 through GW10 were used to assess potential risk to human health and the environment (as mentioned above in Section 4.4).

4.4.2.1 Organic Constituents

While several organic compounds were detected in the soil samples collected from GW03 through GW10, only four pesticides (endosulfan I, gamma-chlordane, heptachlor epoxide, and methoxychlor) and one explosive (hexahydro-1,3,5-trinitro-1,3,5-triazine [RDX]) were detected in the shallow groundwater at concentrations exceeding at least one screening criterion (**Figure 4-14**).

- Endosulfan I was detected above the ESV of 0.0087 microgram per liter (µg/L) in monitoring well MW06 at a concentration of 0.026J µg/L.
- Gamma-chlordane was detected above the ESV of 0.004 µg/L in monitoring well MW06 at a concentration of 0.0061J µg/L.
- Heptachlor epoxide was detected above the tap water RSL of 0.0074 µg/L and ESV of 0.0036 µg/L in three monitoring wells (MW04, MW08, and MW10) at a maximum concentration of 0.028 µg/L.
- Methoxychlor was detected above the ESV of 0.03 µg/L in monitoring well MW06 at a concentration of 0.036J µg/L.
- RDX was detected above the tap water RSL of 0.61 µg/L in monitoring well MW05 at a concentration of 1.78J µg/L.

No other organic constituents (VOCs, SVOCs, pesticides, PCBs, or explosives) were detected in groundwater samples at concentrations above their respective screening criteria.

4.4.2.2 Inorganic Constituents

Three inorganic constituents (total barium, cyanide and dissolved copper) exceeded at least one screening criterion in groundwater collected from GW03 through GW10 (**Figure 4-12**).

- Total barium was detected above the BTAG screening value of 4 µg/L in five of the nine monitoring wells at a maximum concentration of 20.9 µg/L (GW08). However, the maximum barium concentration did not exceed the background 95 percent UTL for barium (118 µg/L) and is likely attributable to naturally occurring conditions.
- Cyanide was detected above the ESV of 1 µg/L in monitoring wells MW03 and MW05 at concentrations of 4.5J µg/L and 5.4J µg/L, respectively.
- Although total copper was not detected in the shallow groundwater, dissolved copper was detected above the ESV of 3 µg/L in monitoring wells MW03 and MW10 at concentrations of 4.2J µg/L and 3.1 µg/L, respectively.

4.4.3 Shallow Groundwater from 2013

One shallow groundwater sample was collected from GW11 in 2013 in order to determine the nature and extent of contamination downgradient of Burial Area B. In addition, the groundwater results were compared to the results from the 2010 sampling of GW03 through GW10 to determine if further evaluation (inclusion in the evaluation of fate and transport or the quantitative risk assessments) was necessary.

While several compounds were detected in the groundwater soil samples collected from GW11, only four SVOCs, three pesticides, one explosive, and three inorganic constituents were detected in GW11 at concentrations exceeding at least one screening criterion (**Figure 4-14**).

- 2,6-DNT was detected above the tap water RSL of 0.042 µg/L in monitoring well GW11 at concentration of 0.653J µg/L.
- Benzo(b)fluoranthene was detected above the tap water RSL of 0.029 µg/L in monitoring well GW11 at a concentration of 0.0637J µg/L.
- Indeno(1,2,3-cd)pyrene was detected above the tap water RSL of 0.029 µg/L in monitoring well GW11 at a concentration of 0.0608J µg/L.
- Nitrobenzene was detected above the tap water RSL of 0.12 µg/L in monitoring well GW11 at a concentration of 0.955 µg/L.
- Beta-BHC was detected above the tap water RSL of 0.022 µg/L in monitoring well GW11 at a concentration of 0.0451J µg/L.
- Gamma-BHC (lindane) was detected above the ESV and BTAG screening value of 0.016 µg/L) in monitoring well GW11 at a concentration of 0.0284J µg/L.
- Heptachlor was detected above the tap water RSL of 0.0018 µg/L, the ESV of 0.0036 µg/L, and the BTAG screening value of 0.0019 µg/L in monitoring well MW11 at a concentration of 0.019J µg/L.
- 2,4,6 TNT was detected above the RSL of 0.76 µg/L in monitoring wells GW11 at a concentration of 2.25 µg/L.
- Total barium was detected above the BTAG screening value of 4 µg/L in monitoring well GW11 at a concentration of 16.4 µg/L. However, this concentration does not exceed the background 95 percent UTL for barium (118 µg/L) and is likely attributable to naturally occurring conditions.
- Cyanide was detected above the tap water RSL of 0.14 µg/L and the ESV and BTAG screening value of 1 µg/L in monitoring wells MW11 at a concentration of 7.28J µg/L.

- Although total chromium was not detected in the shallow groundwater, dissolved chromium was detected above the tap water RSL of 0.031 µg/L in monitoring well MW11 at a concentration of 0.953J µg/L. However this concentration does not exceed the background 95 percent UTL for dissolved chromium (6.04 µg/L) and is likely attributable to naturally occurring conditions.

No other constituents were detected in GW11 at concentrations above their respective screening criteria.

While the SVOC and pesticides were detected at concentrations exceeding their respective screening criteria only in GW11, and the 2,4,6-TNT and cyanide concentrations were higher in GW11 than any other monitoring well, the WPNSTA Yorktown Partnering team (including their associated technical support) agreed that no further evaluation of the data was necessary and no further action required (CH2M HILL, 2013). This agreement was based on the fact that the low level of detections were not likely to pose an unacceptable risk to human health or the environment. In addition, the total barium and dissolved chromium concentrations were attributable to naturally occurring conditions.

4.4.4 Deep Groundwater

Deep groundwater samples were collected in order to characterize the nature and extent of contamination within the Yorktown-Eastover aquifer and to assess potential risks to human health and the environment.

4.4.4.1 Organic Constituents

Two pesticides (endosulfan I and heptachlor epoxide) exceeded at least one screening criterion in groundwater (**Figure 4-17**). No explosives were detected in the deep groundwater at Site 24.

- Endodulfan I was detected above the ESV of 0.0087 µg/L in monitoring well MW01 at a concentration of 0.084J µg/L.
- Heptachlor expoxide was detected above the tap water RSL (0.0074 µg/L) and ESV (0.0036 µg/L) in monitoring well MW02 at a concentration of 0.0098J µg/L.

No other organic constituents (VOCs, SVOCs, pesticides, PCBs, or explosives) were detected in groundwater samples at concentrations above their respective screening criteria.

4.4.4.2 Inorganic Constituents

One inorganic constituent (total and dissolved manganese) exceeded at least one screening criterion in groundwater (**Figure 4-17**).

- Manganese (total and dissolved) in monitoring well MW01 exceeded both the adjusted residential tap water RSL (88 µg/L) and the ESV (100 µg/L). The detected concentrations (113 µg/L [total] and 110 µg/L [dissolved]) only slightly exceeded the base background values; therefore, the manganese detected in groundwater is likely naturally occurring.

TABLE 4-1

Surface Soil Data Exceedance Results

Inside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**ECO Screening Values**	**Yorktown 95% UTL Background - Surface Soil**	**Yorktown Maximum Background - Surface Soil**	A06SS06	A06SS08		A06TP01	A06TP03	A06TP04	A06TP05	YS24-SS14	YS24-SS15	YS24-SS20
Sample ID					A06SS06-00	A06SS08-00	A06SS08D-00	A06TP01-01	A06TP03-01	A06TP04-01	A06TP05-01	YS24-SS14-0410	YS24-SS15-0410	YS24-SS20-0410
Sample Date					11/06/94	11/06/94	11/06/94	11/16/94	11/17/94	11/15/94	11/15/94	04/16/10	04/16/10	04/15/10
Depth					0-0.5'	0-0.5'	0-0.5'	0-2'	0-4'	0-3'	0-2'	0-0.5'	0-0.5'	0-0.5'
Chemical Name														
Volatile Organic Compounds (µg/kg)														
2-Butanone	2,800,000	--	--	--	6 J	11 R	4 J	12 B	12 R	10 B	10 B	15	4.2 B	6.3 B
Carbon tetrachloride	610	3,400	--	--	11 U	11 U	12 U	2 J	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Chloromethane	12,000	5,000	--	--	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	0.57 J
Methyl acetate	7,800,000	--	--	--	NA	NA	NA	NA	NA	NA	NA	8.2	2.8 J	5.1 B
Methylene chloride	11,000	1,250	--	--	11 U	11 U	12 U	8 B	13	5 B	3 B	1.3 B	0.59 B	0.44 B
Xylene, total	63,000	1,300	--	--	11 U	11 U	12 U	1 J	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Semivolatile Organic Compounds (µg/kg)														
Benzo(a)pyrene	15	--	--	340	**40 J**	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Benzo(b)fluoranthene	150	--	--	650	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	38 J
Benzo(g,h,i)perylene	170,000	--	--	350	170 J	100 J	72 J	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Benzo(k)fluoranthene	1,500	--	--	260	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	29 J
bis(2-Ethylhexyl)phthalate	35,000	30,000	--	5,000	370 U	380 U	380 U	380 U	220 J	540 U	380 U	200 U	190 U	840
Butylbenzylphthalate	260,000	30,000	--	--	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	69 J
Di-n-butylphthalate	610,000	40,000	--	--	680	290 J	520	47 J	390 U	61 J	42 J	200 U	190 U	190 U
Pyrene	170,000	--	--	330	57 J	380 U	380 U	380 U	390 U	540 U	380 U	200 U	25 J	190 U
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDE	1,400	583	--	23	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	2.3 J
4,4'-DDT	1,700	114	--	10	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	5.6 J
alpha-BHC	77	226	--	1.6	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	1.9 UL	0.29 J
alpha-Chlordane	1,600	11.0	--	4.7	1.9 UJ	2 UJ	2 UJ	2 UJ	9.8 J	2.8 UJ	2 U	2 UL	0.23 J	3.4 J
Aroclor-1254	110	8000	--	--	37 UJ	38 UJ	38 UJ	38 UJ	**590**	54 UJ	38 U	20 U	19 U	19 UJ
Aroclor-1260	220	8000	--	--	37 UJ	38 UJ	38 UJ	38 UJ	190 J	54 UJ	38 U	20 U	19 U	19 UJ
beta-BHC	270	342	--	14	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	0.98 UL	2.9 J	1.4 J
delta-BHC	270	226	--	5	1.9 UJ	2 UJ	2 UJ	2 UJ	0.84 J	2.8 UJ	2 U	2 UL	1.9 UL	1.9 UJ
Endrin	1,800	1.95	--	3.5	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	29	5.4 UJ	3.8 U	3.8 UL	3.7 UL	0.41 J
gamma-BHC (Lindane)	520	7.75	--	3.3	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	1.9 UL	0.52 J
gamma-Chlordane	1,600	11.0	--	7	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	0.37 J	2.1 J
Heptachlor	110	52.9	--	--	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	0.2 J	1.9 UL	1.9 UJ
Explosives (µg/kg)														
No Detections														

TABLE 4-1

Surface Soil Data Exceedance Results

Inside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**ECO Screening Values**	**Yorktown 95% UTL Background - Surface Soil**	**Yorktown Maximum Background - Surface Soil**	A06SS06	A06SS08		A06TP01	A06TP03	A06TP04	A06TP05	YS24-SS14	YS24-SS15	YS24-SS20
Sample ID					A06SS06-00	A06SS08-00	A06SS08D-00	A06TP01-01	A06TP03-01	A06TP04-01	A06TP05-01	YS24-SS14-0410	YS24-SS15-0410	YS24-SS20-0410
Sample Date					11/06/94	11/06/94	11/06/94	11/16/94	11/17/94	11/15/94	11/15/94	04/16/10	04/16/10	04/15/10
Depth					0-0.5'	0-0.5'	0-0.5'	0-2'	0-4'	0-3'	0-2'	0-0.5'	0-0.5'	0-0.5'
Chemical Name														
Total Metals (mg/kg)														
Aluminum	7,700	pH < 5.5	12,200	19,200	**8,030**	4,310	4,060	4,740	**11,600**	**11,200**	5,570	**8,120**	7,640	**6,050**
Antimony	3.1	78.0	--	11	2.6 UL	2.8 UL	2.8 UL	2.7 R	2.9 UL	3.9 R	2.8 R	0.44 J	0.44 J	0.36 J
Arsenic	0.39	18.0	6.36	63.9	**2.1**	**2.6**	**2**	**1.3 K**	**5.6**	**2.5 K**	**1 K**	**1.9**	**2.9**	0.34 B
Barium	1,500	330	52.9	80.2	45.5	39	38.9	19.3	73.8	50.8	36.3	43.8	31.5	31.9
Beryllium	16	40.0	0.587	1.1	0.24	0.36	0.23	0.22 U	0.22	0.34	0.24	0.4 J	0.33 J	0.3 J
Cadmium	7	32.0	--	1.5	0.32 U	0.41 K	0.55 K	0.33 U	**786**	0.49 U	0.34 U	0.13 J	0.17 J	0.95
Calcium	--	--	2,290	33,500	828	915	509	512	1,300	1,090	466	1,400	1,380	215 J
Chromium	0.29	64.0	18.2	43.2	**10.2**	**5.6**	**4.5**	**5.8 L**	**20.6**	**11.4 L**	**4.5 L**	**12.8**	**12.3**	**8.1**
Cobalt	2.3	13.0	9.93	6.7	2.2	**4.2**	1.9	0.9	**6**	**2.5**	1	2.2	1.7	0.71
Copper	310	70.0	4.25	24.4	3.4	4.3	3.2 B	2.1	**74.4**	2.9	1.3	39	6.1	44.7
Iron	5,500	5 < pH > 8	19,900	20,700	**5,590**	4,170	2,860	3,120 J	**11,000**	**7,110 J**	3,010 J	**7,370**	**7,300**	3,660
Lead	400	120	17.4	136	8.4	10.4	5.2	29.2	**344**	11.2	5	8.9	11.8	17.1
Magnesium	--	--	1,070	6,670	486	277	220	288	617	639	232	694	555	376 J
Manganese	180	220	324	491	61.9	171	82.1	20.2 J	38.5	73.3 J	39.3 J	125	51.8	64.4
Mercury	2.3	0.10	0.111	0.24	0.1 UL	0.12 UL	0.12 UL	0.1 UL	**1.3**	0.16 UL	0.1 UL	0.023 J	0.093	**0.25**
Nickel	150	38.0	9.52	14.2	3.7	4.4	2.3	1.5	17.8	3.6	2	5.1	3.8	2.6
Potassium	--	--	708	4,560	383	265 B	271 B	235	559	493	248	753	765	403 J
Selenium	39	0.52	0.51	2.7	0.56 U	0.59 U	**0.62 K**	0.58 U	0.62 U	0.84 U	0.59 U	0.56 U	0.55 U	0.56 U
Silver	39	560	--	2.1	0.43 U	0.46 U	0.46 U	0.44 U	8.8	0.65 U	0.45 U	0.56 U	0.55 U	3.3
Sodium	--	--	521	21,300	31.6	74.6	68.5	23.9	85.4	110	23.7	184 J	177 J	82.7 J
Vanadium	39	130	27.9	50.3	12.9	9.7	6.4	8.5	18.9	17.1	6.5	14.9	18.3	11.6
Zinc	2,300	120	26.5	113.0	11.1 J	17.6 J	8.2 J	12.2 J	**1,190**	35 J	7.9 J	27.2	25.3	29.9
Wet Chemistry														
pH (ph)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	6	6.58	5.2
Total organic carbon (TOC) (mg/kg)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	15,080	10,830	8,444
Grain Size (pct/p)														
Sieve No. 004 (4.75 mm)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	98.2	98.1	99.8
Sieve No. 010 (2.00 mm)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	86.5	87.1	97.6
Sieve No. 020 (850 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	69.3	72.9	89.6
Sieve No. 040 (425 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	54.8	58.5	77.6
Sieve No. 060 (250 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	30	37.4	54
Sieve No. 080 (180 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	15.2	17.7	28.1
Sieve No. 100 (150 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	12.3	14	21.8
Sieve No. 230 (63-UM)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	1.9	2.7	3.5
Sieve No. 200 (75 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	2.5	3.8	6.2

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text inidcated exceedance of both ECO SVs and Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-2

Surface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95% UTL Background - Surface Soil	Yorktown Maximum Background - Surface Soil	24SS01	24SS05	A06SS07	A06SS09	A06SS10	A06SS11	A06SS12		A06SS13	A06SS14	A06SS15	A06SS16	A06SS17	YS24-SO01		YS24-SO02
Sample ID					24SS01	24SS05	A06SS07-00	A06SS09-00	A06SS10-00	A06SS11-00	A06SS12-00	A06SS12-00D	A06SS13-00	A06SS14-00	A06SS15-00	A06SS16-00	A06SS17-00	YS24-SS01-0410	YS24-SS01P-0410	YS24-SS02-0410
Sample Date					09/09/97	09/09/97	11/06/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	04/16/10	04/16/10	04/16/10
Depth					0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Chemical Name																				
Volatile Organic Compounds (µg/kg)																				
1,4-Dichlorobenzene	2,400	1,280	--	--	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	52 J	350 U	360 U	370 U	370 U	3.4 U	4.9 U	4.8 UJ
2-Butanone	2,800,000	--	--	--	11 U	10 U	12 U	11 U	11 R	12 U	11 R	4 J	11 R	11 R	11 R	11 R	11 U	9 K	10 K	39 J
Acetone	6,100,000	--	--	--	11 U	10 U	12 U	11 U	11 U	12 U	3 J	12 U	11 U	11 U	11 U	11 U	11 U	82 B	100 B	340 B
Benzene	1,100	1,140	--	--	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ
Carbon disulfide	82,000	--	--	--	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ
Chlorobenzene	29,000	2,400	--	--	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	1 J	11 U	3.4 U	4.9 U	4.8 UJ
Ethylbenzene	5,400	1,815	--	--	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ
Methyl acetate	7,800,000	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	120 K	59 K	160 J
Toluene	500,000	40,000	--	--	1 J	10 U	12 U	11 U	11 U	1 J	11 U	12 U	11 U	11 U	11 U	1 J	11 U	0.49 B	0.42 B	4.8 UJ
Semivolatile Organic Compounds (µg/kg)																				
2,4-Dinitrotoluene	1,600	11,000	--	--	250 U	250 U	260 U	260 U	260 U	260 U	260 U	260 U	360 U	350 U	360 U	370 U	370 U	1,500 U	1,500 U	1,500 U
2-Chloronaphthalene	180,000	--	--	--	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
4-Chloroaniline	2,400	500	--	--	350 U	340 U	390 U	370 UJ	360 UJ	180 J	370 U	370 U	360 U	350 U	360 UJ	370 U	370 U	370 U	370 U	360 U
Benzaldehyde	780,000	--	--	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190 U	190 U	29 J
Benzo(a)anthracene	150	--	--	220	350 U	340 U	390 U	40 J	360 U	59 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
Benzo(a)pyrene	15	--	--	340	350 U	340 U	390 U	**140 J**	360 U	**90 J**	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
Benzo(b)fluoranthene	150	--	--	650	350 U	340 U	390 U	46 J	360 U	150 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
Benzo(g,h,i)perylene	170,000	--	--	350	350 U	340 U	390 U	870 J	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	30 J
Benzo(k)fluoranthene	1,500	--	--	260	350 U	340 U	390 U	50 J	360 U	100 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
bis(2-Ethylhexyl)phthalate	35,000	30,000	--	5,000	350 U	340 U	390 U	50 J	360 U	3,600	370 U	540	360 U	350 U	360 U	370 U	370 U	190 U	230	190 U
Butylbenzylphthalate	260,000	30,000	--	--	350 U	340 U	390 U	370 U	360 U	270 J	370 U	780	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
Chrysene	15,000	--	--	480	350 U	340 U	390 U	58 J	360 U	94 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
Di-n-butylphthalate	610,000	40,000	--	--	350 U	340 U	1,100	440	2,300	2,500	1,000	4,600	2,600	760	200 J	68 J	2,500	190 U	190 U	190 U
Di-n-octylphthalate	35,000	30,000	--	66	350 U	340 U	390 U	370 U	360 U	98 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	450	190 U
Fluoranthene	230,000	--	--	270	350 U	340 U	390 U	100 J	360 U	88 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	23 J
Indeno(1,2,3-cd)pyrene	150	--	--	340	350 U	340 U	390 U	63 J	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
Phenanthrene	1,700,000	--	--	--	350 U	340 U	390 U	80 J	360 U	64 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U
Pyrene	170,000	--	--	330	350 U	340 U	390 U	240 J	360 U	100 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	35 J
Pesticide/Polychlorinated Biphenyls (µg/kg)																				
4,4'-DDD	2,000	583	--	12	3.6 U	0.54 J	3.9 UJ	3.7 U	3.6 U	35	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	3.6 UL
4,4'-DDE	1,400	114	--	23	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	11 J	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	1.1 J
4,4'-DDT	1,700	100	--	10	0.61 B	0.58 B	3.9 UJ	3.7 U	3.6 U	29	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	1.5 J	1.4 J	2.9 J
Aldrin	29	3.63	--		1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL
alpha-BHC	77	226	--	1.6	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL
alpha-Chlordane	1,600	11.0	--	4.7	1.8 U	0.49 J	2 UJ	1.9 U	1.9 U	**74 J**	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	0.32 J	0.25 J	0.5 J
beta-BHC	270	342	--	14	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	0.96 U	0.95 UL	0.94 UL
delta-BHC	270	226	--	5	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL
Dieldrin	30	10.5	--	4.4	0.59 J	3.5 U	3.9 UJ	3.7 U	3.6 U	6.6 J	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	3.6 UL
Endosulfan I	37,000	6.32	--	2.1	0.38 J	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL
Endosulfan II	37,000	6.32	--	2.1	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	0.52 L
Endosulfan sulfate	37,000	6.32	--	3.7	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	1.5 J
Endrin	1,800	1.95	--	3.5	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	0.41 J	0.38 J	3.6 UL
Endrin aldehyde	1,800	1.95	--	12	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	3.6 UL
Endrin ketone	1,800	1.95	--	4.5	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	1.4 J
gamma-BHC (Lindane)	520	7.75	--	3.3	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL
gamma-Chlordane	1,600	11.0	--	7	1.8 U	0.5 J	2 UJ	1.9 U	1.9 U	**76**	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	0.22 J	0.3 J	0.68 J
Heptachlor	110	52.9	--	--	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	0.23 J	0.24 J
Heptachlor epoxide	53	52.9	--	1.8	1.8 U	0.18 J	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	0.49 L
Methoxychlor	31,000	500	--	--	18 U	17 U	20 UJ	19 U	19 U	99 U	19 U	19 U	18 U	18 U	19 U	19 U	19 U	19 U	19 UL	4.8 J
Explosives (µg/kg)																				
No Detections																				

TABLE 4-2

Surface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**ECO Screening Value**	**Yorktown 95% UTL Background - Surface Soil**	**Yorktown Maximum Background - Surface Soil**	24SS01	24SS05	A06SS07	A06SS09	A06SS10	A06SS11	A06SS12		A06SS13	A06SS14	A06SS15	A06SS16	A06SS17	YS24-SO01		YS24-SO02
Sample ID					24SS01	24SS05	A06SS07-00	A06SS09-00	A06SS10-00	A06SS11-00	A06SS12-00	A06SS12-00D	A06SS13-00	A06SS14-00	A06SS15-00	A06SS16-00	A06SS17-00	YS24-SS01-0410	YS24-SS01P-0410	YS24-SS02-0410
Sample Date					09/09/97	09/09/97	11/06/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	04/16/10	04/16/10	04/16/10
Depth					0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Chemical Name																				
Total Metals (mg/kg)																				
Aluminum	7,700	pH < 5.5	12,200	19,200	7,500 J	4,250 J	6,040	6,330	6,890	4,180	4,870	4,670	2,290	**1,760**	5,390	**5,650**	4,210	7,100	6,740	**5,770**
Antimony	3.1	78.0	--	11	0.81 UL	0.79 UL	2.8 UL	2.7 UL	2.7 UL	2.8 UL	2.7 UL	2.7 UL	2.6 UL	2.6 UL	2.7 UL	2.6 UL	2.7 UL	0.48 J	0.4 J	0.88 J
Arsenic	0.39	18.0	6.36	63.9	**3.4**	**1 J**	**2.8**	**2.1**	**1.4**	**2**	**1.2**	**1.2**	**0.64**	**0.88**	**1.2**	**1.7**	**1.2**	**3.1**	**2.1**	**1.8**
Barium	1,500	330	52.9	80.2	31.6 J	32.4 J	32	51.3	34.4	46.8	42.6	39.1	22.9	16.3	33.8	37.2	44	40.4	39.9	31.9
Beryllium	16	40.0	0.587	1.1	0.09 J	0.14 J	0.19	0.32	0.17 K	0.09 K	0.32	0.3	0.07	0.08	0.26 K	0.31 K	0.26	0.47 J	0.33 J	0.31 J
Cadmium	7	32.0	--	1.5	0.15 B	0.17 B	0.34 U	0.9 K	0.33 U	0.61	0.34 U	0.41 K	0.31 U	0.37 K	0.33 U	0.32 U	4.3	0.31 J	0.27 J	0.49 J
Calcium	--	--	2,290	33,500	3,120 J	430 J	824	398	419	210	274	269	226	135	221	117	175	780	745	580
Chromium	0.29	64.0	18.2	43.2	**16.5 J**	**5.9 J**	**9.5**	**5.8**	**6.2**	**7.7**	**4**	**5.2**	**2.9**	**2.5**	**4.7**	**4.5**	**3.4**	**12.2**	**9.6**	**10**
Cobalt	2.3	13.0	9.93	6.7	2.1 J	**3.5 J**	1.4	2	1.8	0.86	1.3	1.6	0.79	0.85	**2.8**	**2.6**	**3.8**	1.9	1.7	1.9
Copper	310	70.0	4.25	24.4	7.2	26.4	3.3 B	4.3	1.9	**139**	2.9 B	3.8	1.5 B	1.3 B	9.8	3.5	1.4 B	6.2	5.7	5.5
Cyanide	160	15.8	--	--	0.14 L	2.1 UL	2.9 UL	2.8 UL	2.8 U	2.9 U	2.8 UL	2.8 UL	2.7 L	2.7 UL	2.7 U	2.8 U	2.8 UL	0.55 U	0.53 U	0.53 U
Iron	5,500	5 < pH > 8	19,900	20,700	**8,880**	3,360	**5,640**	3,970	3,650	3,180	2,300	2,510	1,510	1,580	2,980	**2,930**	2,520	**7,710**	**6,190**	**8,470**
Lead	400	120	17.4	136.0	10.9	11.9	7	22.8	6.1	34.6	6.2	7.1	4.4	3.3	11.1	7.6	4.1	21.2	14.3	38.9
Magnesium	--	--	1,070	6,770	878 J	296 J	400	276	435	342	254	259	176	133	303	311	204	500 J	473 J	383 J
Manganese	180	220	324	491	65.1	93.8	39	77.9	42.9	19.3	145	139	27.6	22.3	60.4	143	73.6	90.3	83.1	114
Mercury	2.3	0.10	0.111	0.24	0.07 J	0.09 J	0.1 UL	0.09 UL	0.09 UL	**4.7**	0.1 UL	0.1 UL	0.09 UL	0.1 UL	0.11 UL	0.1 UL	0.11 UL	0.065	0.072	0.062
Nickel	150	38.0	9.52	14.2	4.7 J	3.9 J	2	4.3	2.3	1.2	2.8	3.4	1.4	1.3	3.2	3.4	4.9	4	4.1	5
Potassium	--	--	708	4,560	821 J	249 J	538	280 B	305	181	294 B	293 B	240 B	189 B	247	241	198 B	589	515 J	365 J
Selenium	39	0.52	0.51	2.7	0.87 U	0.85 U	0.59 U	0.58 U	0.57 U	**0.66 K**	**0.78 K**	0.59 U	0.54 U	**0.58 K**	0.57 U	0.56 U	0.58 U	0.56 U	0.55 U	0.55 U
Silver	39	560	--	2.1	0.21 U	0.21 U	0.45 U	0.45 U	0.44 U	8.1	0.45 U	0.45 U	0.42 U	0.42 U	0.44 U	0.43 U	0.45 U	0.56 U	0.55 U	0.55 U
Sodium	--	--	521	21,300	47.3 U	46.1 U	71.2	23.8	32.9	77.3	78.4	68.2	73.7	25.8	23.9	22.9	27.9	165 J	169 J	176 J
Vanadium	39	130	27.9	50.3	21.1	10.7	13.2	9	10.3	13.1	5	5.5	4.1	3.7	6.7	6	4.9	19.6	17.8	34.3
Zinc	2,300	120	26.5	113.0	31.2 K	42.3	11.3 J	28.1 J	22.9 J	13.1 J	13.2 J	15.1 J	4.9 J	9.7 J	68.3 J	24.7 J	27.4 J	22.6	22	39.3
Wet Chemistry																				
Cation Exchange Capacity (MEQ/100G) (mg/kg)	--	--	--	--	8,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	--	--	--	--	6.4	NA	NA	NA	NA	NA	NA	NA	5.67	5.34	5.67	4.93	5.53	5.75	NA	5.26
Total organic carbon (TOC) (mg/kg)	--	--	--	--	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10,790	NA	28,410
Geotechnical (g/cc)																				
Density	--	--	--	--	1.31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size (pct/p)																				
Sieve No. 004 (4.75 mm)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	77.4
Sieve No. 010 (2.00 mm)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	63.9
Sieve No. 020 (850 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50.3
Sieve No. 040 (425 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	35.6
Sieve No. 060 (250 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18.4
Sieve No. 080 (180 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8
Sieve No. 100 (150 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.1
Sieve No. 230 (63-UM)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.9
Sieve No. 200 (75 um)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.5

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text inidcated exceedance of both ECO SVs and Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

B - Analyte not detected above the level reported in associated 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

NA - Not analyzed

ND - Not Detected

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

g/cc - Grams per cubic centimeter

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-2

Surface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	YS24-SO03	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-SS11		YS24-SS12	YS24-SS13	YS24-SS16	YS24-SS17	YS24-SS18	YS24-SS19	YS24-SS21
Sample ID		YS24-SS03-0410	YS24-SS04-0410	YS24-SS05-0410	YS24-SS06-0410	YS24-SS07-0410	YS24-SS08-0410	YS24-SS11-0410	YS24-SS11P-0410	YS24-SS12-0410	YS24-SS13-0410	YS24-SS16-0410	YS24-SS17-0410	YS24-SS18-0410	YS24-SS19-0410	YS24-SS21-0410
Sample Date		04/16/10	04/15/10	04/15/10	04/15/10	04/19/10	04/15/10	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10	04/15/10	04/15/10	04/15/10	04/16/10
Depth		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Chemical Name																
Volatile Organic Compounds (µg/kg)																
1,4-Dichlorobenzene	2,400	3.8 UL	3.8 U	3 UJ	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 UL	4.4 U	4.4 U	4.1 U
2-Butanone	2,800,000	11	3.1 B	7.5 U	2.8 B	8.4 K	2.5 B	11	11 J	16 K	10 K	9.4 B	13 B	11 B	6.7 B	10 J
Acetone	6,100,000	130 B	33 B	19 B	33 B	98 B	19 B	250 B	270 B	150 B	160 B	160 B	130 B	130 B	160 B	120 B
Benzene	1,100	3.8 U	3.8 U	0.2 K	3.6 U	3.8 U	0.24 J	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Carbon disulfide	82,000	3.8 U	0.71 J	0.99 K	3.8 K	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Chlorobenzene	29,000	3.8 UL	3.8 U	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Ethylbenzene	5,400	3.8 UL	3.8 U	1.6 K	3.6 U	3.8 U	5	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Methyl acetate	7,800,000	2,100 J	3.8 U	3 U	16 K	13 K	3.8 U	9.2	21	29	7 K	3.2 B	7.7 J	5.7 B	2 B	4.4
Toluene	500,000	0.69 B	0.52 B	1.1 B	0.55 B	3.8 U	1.9 B	0.35 B	1.1 B	4.4 U	4 U	0.48 B	4.4 U	0.49 B	3.6 B	0.36 B
Semivolatile Organic Compounds (µg/kg)																
2,4-Dinitrotoluene	1,600	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500	1,500 U	1,500 U	1,500 U
2-Chloronaphthalene	180,000	190 U	190 U	190 U	200 U	190 U	200 U	66 J	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
4-Chloroaniline	2,400	190 U	380 U	380 U	400 U	380 U	380 U	360 UJ	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
Benzaldehyde	780,000	94 U	190 U	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Benzo(a)anthracene	150	190 U	47 J	190 U	64 J	190 U	66 J	190 UJ	230 U	190 U	190 U	190 U	200 U	34 J	38 J	200 U
Benzo(a)pyrene	15	190 U	**50 J**	190 U	**70 J**	190 U	**63 J**	190 UJ	230 U	190 U	190 U	190 U	**22 J**	**35 J**	**47 J**	200 U
Benzo(b)fluoranthene	150	190 U	94 J	190 U	110 J	32 J	53 J	190 UJ	230 U	190 U	190 U	190 U	23 K	36 J	62 J	200 U
Benzo(g,h,i)perylene	170,000	190 U	43 J	190 U	59 J	190 U	48 J	190 UJ	230 U	190 U	190 U	190 U	200 U	27 J	36 J	200 U
Benzo(k)fluoranthene	1,500	190 U	100 J	190 U	87 J	31 J	70 J	190 UJ	230 U	190 U	190 U	190 U	200 U	40 J	56 J	200 U
bis(2-Ethylhexyl)phthalate	35,000	190 U	190 U	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200
Butylbenzylphthalate	260,000	190 U	190 U	190 U	200 U	44 J	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Chrysene	15,000	190 U	91 J	190 U	100 J	33 J	74 J	190 UJ	230 U	190 U	190 U	190 U	200 U	38 J	61 J	200 U
Di-n-butylphthalate	610,000	190 U	25 J	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Di-n-octylphthalate	35,000	190 U	190 U	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Fluoranthene	230,000	190 U	74 J	30 J	150 J	36 J	140 J	190 UJ	230 U	190 U	190 U	190 U	48 J	53 J	73 J	200 U
Indeno(1,2,3-cd)pyrene	150	190 U	190 U	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Phenanthrene	1,700,000	190 U	190 U	190 U	38 J	34 J	88 J	190 UJ	230 U	190 U	190 U	190 U	49 J	33 J	34 J	200 U
Pyrene	170,000	190 U	73 J	34 J	130 J	49 J	120 J	190 UJ	230 U	190 U	190 U	190 U	44 J	75 J	82 J	200 U
Pesticide/Polychlorinated Biphenyls (µg/kg)																
4,4'-DDD	2,000	3.7 U	3.8 UJ	3.8 UJ	0.78 J	3.8 U	3.8 U	3.6 U	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
4,4'-DDE	1,400	3.7 U	3.8 UJ	0.41 J	1.2 J	1 J	3.8 U	0.66 J	0.59 L	3.8 UL	0.93 L	0.56 J	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
4,4'-DDT	1,700	3.7 U	0.59 J	3.8 UJ	0.98 J	0.58 J	3.8 U	0.58 J	4.5 UL	3.8 UL	2.5 L	0.69 J	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
Aldrin	29	1.9 U	1.9 UJ	1.9 UJ	2 UJ	0.47 J	2 U	0.27 J	0.42 J	1.9 UL	0.26 J	1.9 UJ	2 UJ	2 UJ	1.9 UJ	2 UL
alpha-BHC	77	1.9 U	1.9 UJ	1.9 UJ	2 UJ	1.9 U	2 U	1.8 U	2.3 UL	1.9 UL	1.9 UL	0.71 J	2 UJ	2 UJ	1.9 UJ	2 UL
alpha-Chlordane	1,600	1.9 U	1.9 UJ	1.9 UJ	2 UJ	2.5	2 U	0.18 J	2.3 UL	1.9 UL	1.9 UL	0.43 J	2 UJ	2 UJ	1.9 UJ	0.43 J
beta-BHC	270	1.9 U	1.9 UJ	1.9 UJ	2 UJ	1.9 U	0.99 U	0.93 U	1.2 UL	0.77 J	0.96 UL	1.9 UJ	2 UJ	0.99 J	1.9 UJ	0.99 J
delta-BHC	270	1.9 U	1.9 UJ	1.9 UJ	2 UJ	0.36 J	2 U	0.27 J	0.44 J	1.9 UL	1.9 UL	0.48 J	0.2 J	2 UJ	0.34 J	2 UL
Dieldrin	30	3.7 U	3.8 UJ	3.8 UJ	4 UJ	3.8 U	3.8 U	3.6 U	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
Endosulfan I	37,000	1.9 U	1.9 UJ	1.9 UJ	2 UJ	1.9 U	2 U	1.8 U	2.3 UL	1.9 UL	1.9 UL	0.21 J	2 UJ	0.2 J	1.9 UJ	2 UL
Endosulfan II	37,000	3.7 U	3.8 UJ	3.8 UJ	4 UJ	3.8 U	3.8 U	3.6 U	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
Endosulfan sulfate	37,000	3.7 U	3.8 UJ	3.8 UJ	4 UJ	3.8 U	3.8 U	0.42 J	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	0.38 J	3.8 UL
Endrin	1,800	3.7 U	3.8 UJ	3.8 UJ	4 UJ	3.8 U	3.8 U	0.49 J	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
Endrin aldehyde	1,800	0.42 J	3.8 UJ	0.42 J	4 UJ	0.7 L	3.8 U	0.52 J	4.5 UL	3.8 UL	3.7 UL	0.97 J	3.8 UJ	3.9 UJ	3.7 UJ	0.46 J
Endrin ketone	1,800	3.7 U	3.8 UJ	3.8 UJ	4 UJ	3.8 U	3.8 U	0.81 J	0.81 L	3.8 UL	0.44 J	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
gamma-BHC (Lindane)	520	1.9 U	1.9 UJ	1.9 UJ	2 UJ	1.9 U	2 U	1.8 U	2.3 UL	1.9 UL	1.9 UL	0.98 J	0.68 J	1.1 J	0.28 J	2 UL
gamma-Chlordane	1,600	1.9 U	1.9 UJ	1.9 UJ	2 UJ	0.44 J	2 U	0.21 J	0.37 J	1.9 UL	1.9 UL	1 J	2 UJ	0.24 J	1.9 UJ	2 UL
Heptachlor	110	1.9 U	1.9 UJ	1.9 UJ	2 UJ	1.9 U	2 U	0.46 J	0.94 L	1.9 UL	1.9 UL	0.35 J	2 UJ	2 UJ	1.9 UJ	2 UL
Heptachlor epoxide	53	1.9 U	1.9 UJ	1.9 UJ	2 UJ	0.22 J	2 U	1.8 U	2.3 UL	1.9 UL	1.9 UL	1.9 UJ	2 UJ	2 UJ	1.9 UJ	2 UL
Methoxychlor	31,000	19 U	19 UJ	19 UJ	20 UJ	19 U	20 U	18 U	23 UL	19 UL	19 UL	19 UJ	20 UJ	20 UJ	19 UJ	20 UL
Explosives (µg/kg)																
No Detections																

TABLE 4-2

Surface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	YS24-SO03	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-SS11		YS24-SS12	YS24-SS13	YS24-SS16	YS24-SS17	YS24-SS18	YS24-SS19	YS24-SS21
Sample ID		YS24-SS03-0410	YS24-SS04-0410	YS24-SS05-0410	YS24-SS06-0410	YS24-SS07-0410	YS24-SS08-0410	YS24-SS11-0410	YS24-SS11P-0410	YS24-SS12-0410	YS24-SS13-0410	YS24-SS16-0410	YS24-SS17-0410	YS24-SS18-0410	YS24-SS19-0410	YS24-SS21-0410
Sample Date		04/16/10	04/15/10	04/15/10	04/15/10	04/19/10	04/15/10	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10	04/15/10	04/15/10	04/15/10	04/16/10
Depth		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Chemical Name																
Total Metals (mg/kg)																
Aluminum	7,700	3,100	7,600	8,240	9,980	4,790	7,140	6,630	8,050	7,530	7,370	7,030	5,500	5,350	5,600	6,530
Antimony	3.1	1.1 UL	1.1 J	0.49 J	0.4 J	0.38 J	0.66 J	0.37 J	0.44 J	0.39 J	1.1 U	1.1 U	1.2 UL	1.2 U	1.1 U	0.66 J
Arsenic	0.39	1.1 U	70.4	3.9	5.1	0.8 B	6.8	0.67 J	0.85 J	1.6	1.6	0.78 B	1.2 U	1.2 U	1.1 U	0.79 J
Barium	1,500	13.6 J	31.4	20.4 J	40.2	23.7	27.4	32.3	38.7	113	36.2	30	33.3	28.3	26.7	40
Beryllium	16	0.09 B	0.46 J	0.41 J	0.63	0.24 B	0.5 J	0.31 J	0.44 J	2.4	0.38 J	0.31 J	0.28 J	0.19 B	0.24 J	0.43 J
Cadmium	7	0.56 U	1.1	0.97	1.5	0.56 U	0.44 J	1.2	1.3	0.27 J	0.12 J	0.24 J	0.24 J	0.28 J	0.16 J	0.05 J
Calcium	--	209 J	16,100	5,320	4,650	252 J	140,000	278 J	323 J	7,520	1,260	303 J	249 J	364 J	292 J	435 J
Chromium	0.29	3.5	14.8	15.1	21	5.1	18.4	6.4	8.2	6.1	10.2	7.9	5	5.3	5.9	7.5
Cobalt	2.3	0.66	2.9	2.6	5.2	0.89	3	1.6	1.9	4.1	2.2	1.1	1.3	1	0.94	3.7
Copper	310	1.3	4.7	8.4	6.6	2.5	4.6	6.2	5.9	2.5	4	2.6	2.2	2.2	2.4	3.1
Cyanide	160	0.56 U	0.55 U	0.56 U	0.6 U	0.56 U	0.56 U	0.54 U	0.66 U	0.56 U	0.54 U	0.55 U	0.57 U	0.58 U	0.55 U	0.57 U
Iron	5,500	2,250	11,000	13,900	17,700	3,330	14,100	3,280	4,090	7,950	5,910	4,160	2,600	3,010	3,070	3,570
Lead	400	5.1 K	15	9.1	13.2	19.3	15.7	10.9	14.7	9.2	11.8	12.8	46.9	9.8	9.5	11
Magnesium	--	269 J	1,100	776	1,540	289 J	1,820	356 J	444 J	2,010	565	428 J	311 J	359 J	340 J	432 J
Manganese	180	36.7 K	90.7	51	106	69.4	87.1	109	120	963	76.8	67.1	79.4 K	49.8	66.4	170
Mercury	2.3	0.037 U	0.025 J	0.021 J	0.034 J	0.028 B	0.038 U	0.024 J	0.023 J	0.028 J	0.048	0.038	0.038 U	0.023 J	0.022 J	0.044
Nickel	150	1.5	5.1	4.7	8.9	2.1	6.5	3.4	4.1	10.5	4.2	2.5	2.5	2.2	2.1	4.6
Potassium	--	151 J	1,630	999	1,740	256 J	1,520	340 J	435 J	624	549 J	523 J	278 J	430 J	309 J	404 J
Selenium	39	0.56 U	0.56 U	0.56 U	0.6 U	0.56 U	0.57 U	0.54 U	0.67 U	0.56 U	0.56 U	0.55 U	0.58 UL	0.58 U	0.55 U	0.58 U
Silver	39	0.56 U	0.56 U	0.56 U	0.6 U	0.56 U	0.57 U	0.54 U	0.67 U	0.56 U	0.56 U	0.55 U	0.58 U	0.58 U	0.55 U	0.58 U
Sodium	--	107 J	226 J	112 J	137 J	102 J	1,260	153 J	173 J	189 J	161 J	80.9 J	83.8 J	91.1 J	91.5 J	154 J
Vanadium	39	8.4	17.6	22.1	24.2	7.7	18.9	11	14.2	13.1	15.1	12	8.5	9.6	9.8	11.4
Zinc	2,300	7.6	23.2	19.6	40.1	12.8	29.2	31.2	36.3	55.9	18	11.3	23.5	36.4	12.7	18.7
Wet Chemistry																
Cation Exchange Capacity (MEQ/100G) (mg/kg)	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	--	5.22	7.99	8.06	7.69	5.37	8.35	5.45	NA	6.02	5.95	6.78	5.41	6	5.85	5.45
Total organic carbon (TOC) (mg/kg)	--	11,380	10,620	2,262	76,070	14,910	5,832	8,592	NA	20,040	17,190	12,040	19,460	11,780	13,460	16,660
Geotechnical (g/cc)																
Density	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size (pct/p)																
Sieve No. 004 (4.75 mm)	--	92.3	99.6	99.7	76	94.8	NA	99.8	NA	97.9	98.4	96.4	100	95.8	99.7	99.8
Sieve No. 010 (2.00 mm)	--	79.5	88.4	96.2	61	84.8	NA	98.5	NA	88.1	86.1	87.8	97.8	95	97.5	92.2
Sieve No. 020 (850 um)	--	46.9	61.5	87.1	40.4	69.6	NA	90.4	NA	74.6	69.3	77	89.2	88.1	89.3	75.5
Sieve No. 040 (425 um)	--	25.6	43.4	72.7	25.1	53.9	NA	77.5	NA	61.4	52.1	65.7	77.3	78.2	76.6	59.3
Sieve No. 060 (250 um)	--	10.5	26.2	52.2	16.6	32.8	NA	48.8	NA	41.7	29.3	42.2	45.5	52	43.6	31.6
Sieve No. 080 (180 um)	--	5.6	16.5	30.3	10.8	14.5	NA	22.8	NA	19.5	12.3	19.5	22.1	26.8	19.6	11.3
Sieve No. 100 (150 um)	--	4.5	14.2	24	9.3	11.3	NA	17.9	NA	14.9	9.2	14.7	16.8	20.8	14.3	8.8
Sieve No. 230 (63-UM)	--	0.7	1.5	6.9	0.7	2.7	NA	3.3	NA	3.4	1.8	2.4	1.6	2.8	1.9	1.5
Sieve No. 200 (75 um)	--	0.9	2.2	9	1.1	3.7	NA	5.5	NA	5.4	2.4	3.7	2.7	4.8	2.6	2.1

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text inidcated exceedance of both ECO SVs and Adjusted Residential So

RSLs were adjusted for noncarcinogens to account for exposure to multiple constit

B - Analyte not detected above the level reported in associated 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

NA - Not analyzed

ND - Not Detected

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

g/cc - Grams per cubic centimeter

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-3

Soil Data Exceedance Results

Within the Sludge Area

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**Yorktown 95 % UTL Background - Subsurface Soil**	**Yorktown 95% UTL Background - Surface Soil**	**Yorktown Maximum Background - Subsurface Soil**	**Yorktown Maximum Background - Surface Soil**	YS24-GW/SB09	YS24-SS09	YS24-SS10
Sample ID						YS24-SB09-0.5-2-0410	YS24-SS09-0410	YS24-SS10-0410
Sample Date						04/19/10	04/19/10	04/20/10
Depth						0.5-2'	0-0.5'	0-0.5'
Chemical Name								
Volatile Organic Compounds (µg/kg)								
2-Butanone	2,800,000	--	--	5	--	9 U	3.6 B	5.5 K
Chloromethane	12,000	--	--	--	--	3.6 U	3.4 U	0.39 K
Methyl acetate	7,800,000	--	--	--	--	3.6 U	18 K	3.9 K
Semivolatile Organic Compounds (µg/kg)								
2-Methylnaphthalene	31,000	--	--	--	--	180 U	49 J	56 J
Benzo(b)fluoranthene	150	--	--	--	650	180 U	46 J	31 J
Chrysene	15,000	--	--	--	480	180 U	87 J	52 J
Dibenzofuran	7,800	--	--	--	--	180 U	26 J	190 U
Fluoranthene	230,000	--	--	--	270	180 U	42 J	26 J
Naphthalene	3,600	--	--	--	--	180 U	33 J	42 J
Phenanthrene	1,700,000	--	--	--	--	180 U	84 J	37 J
Pyrene	170,000	--	--	--	330	180 U	52 J	29 J
Pesticide/Polychlorinated Biphenyls (µg/kg)								
4,4'-DDD	2,000	--	--	3.1	12	3.6 UL	0.49 J	0.47 J
4,4'-DDE	1,400	--	--	3.9	23	3.6 UL	1.7 J	1.4 J
4,4'-DDT	1,700	--	--	--	10	3.6 UL	1.8 J	3.2 J
alpha-BHC	77	--	--	1.3	1.6	1.8 UL	0.4 J	1.9 U
alpha-Chlordane	1,600	--	--	4.7	4.7	1.8 UL	1.2 J	1.9 U
beta-BHC	270	--	--	0.99	14	1.8 UL	1.6 J	1.9 U
delta-BHC	270	--	--	0.8	5	1.8 UL	0.45 J	1.9 U
Endosulfan I	37,000	--	--	2.3	2.1	1.8 UL	0.49 J	1.9 U
Endosulfan sulfate	37,000	--	--	2.7	3.7	3.6 UL	3.6 U	0.55 J
Endrin	1,800	--	--	--	3.5	3.6 UL	0.59 J	3.6 U
Endrin ketone	1,800	--	--	2.5	4.5	3.6 UL	1.7 J	1.3 J
Heptachlor	110	--	--	--	--	1.8 UL	0.35 J	1.9 U
Heptachlor epoxide	53	--	--	--	1.8	1.8 UL	0.42 J	1.9 U
Explosives (µg/kg)								
No Detections								
Total Metals (mg/kg)								
Aluminum	7,700	13,000	12,200	18,400	19,200	3,640	4,160	4,590
Barium	1,500	84.5	52.9	58.0	80.2	28.5	22.8	26.6
Beryllium	16	--	0.587	0.52	1.1	0.14 B	0.3 J	0.53 J
Cadmium	7	--	--	--	1.5	0.04 J	0.2 B	0.1 B
Calcium	--	2,380	2,290	162,000	33,500	107 J	144 J	102 J
Chromium	0.29	33.7	18.2	37.5	43.2	**6.9**	**6.2**	**6.2**
Cobalt	2.3	5.18	9.93	7.2	6.7	**2.9**	**5.4**	**8.7**
Copper	310	3.17	4.25	9.6	24.4	4.6	6.5	2.8
Iron	5,500	32,000	19,900	31,700	20,700	**5,820**	4,660	5,400
Lead	400	8.79	17.4	83.7	136.0	7.7	12.4	8.9
Magnesium	--	1,120	1,070	4,630	6,770	302 J	302 J	296 J
Manganese	180	176	324	284	491	76.6	132	**245**

TABLE 4-3

Soil Data Exceedance Results

Within the Sludge Area

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**Yorktown 95 % UTL Background - Subsurface Soil**	**Yorktown 95% UTL Background - Surface Soil**	**Yorktown Maximum Background - Subsurface Soil**	**Yorktown Maximum Background - Surface Soil**	YS24-GW/SB09	YS24-SS09	YS24-SS10
Sample ID						YS24-SB09-0.5-2-0410	YS24-SS09-0410	YS24-SS10-0410
Sample Date						04/19/10	04/19/10	04/20/10
Depth						0.5-2'	0-0.5'	0-0.5'
Chemical Name								
Nickel	150	17.6	9.52	11	14.2	3.9	5.2	6
Potassium	--	901	708	4,240	4,560	242 J	241 J	223 J
Sodium	--	811	521	10,400	21,300	106 J	104 J	89.6 J
Vanadium	39	48.3	27.9	53.8	50.3	8.8	10.9	9.9
Zinc	2,300	28	26.5	52.9	113.0	11.4	17.6	25.8
Wet Chemistry								
pH (ph)	--	--	--			4.61	5	4.87
Total organic carbon (TOC) (mg/kg)	--	--	--			12,140	43,860	21,750
Grain Size (pct/p)								
Sieve No. 004 (4.75 mm)	--	--	--			99.4	98.2	99.8
Sieve No. 010 (2.00 mm)	--	--	--			93.7	91.1	97
Sieve No. 020 (850 um)	--	--	--			80.5	79.6	88.2
Sieve No. 040 (425 um)	--	--	--			64.1	61.6	71.9
Sieve No. 060 (250 um)	--	--	--			28.2	27.7	30.9
Sieve No. 080 (180 um)	--	--	--			11.8	11.9	10.9
Sieve No. 100 (150 um)	--	--	--			9.8	9.7	8.8
Sieve No. 230 (63-UM)	--	--	--			1.3	1.6	0.8
Sieve No. 200 (75 um)	--	--	--			1.7	1.9	1.1

Notes:

Green text indicates exceedance of Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

U - The material was analyzed for, but not detected

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-4

Soil Debris/Subsurface Soil Data Exceedance Results

Inside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**Yorktown 95 % UTL Background - Subsurface Soil**	**Yorktown Maximum Background - Subsurface Soil**	A06TP01	A06TP02		A06TP03	A06TP04	A06TP05	A06TP06		YS24-SB14	YS24-SB15	YS24-SB20	YS24-SB20B	YS24-SB121
Sample ID				A06TP01-02	A06TP02-01	A06TP02-02	A06TP03-02	A06TP04-02	A06TP05-02	A06TP06-01	A06TP06-02	YS24-SB14-10-11-0410	YS24-SB15-7-8-0410	YS24-SB20-7-8-0410	YS24-SB20B-7-8-0410	YS24-SB121-0410-SO
Sample Date				11/16/94	11/16/94	11/16/94	11/17/94	11/15/94	11/15/94	11/15/94	11/15/94	04/21/10	04/21/10	04/20/10	04/20/10	04/22/10
Depth				2-3'	1-9'	9-10'	4-4.5'	3-4'	2-3'	2-3'	4-6'	10-11'	7-8'	7-8'	7-8'	4-5'
Chemical Name																
Volatile Organic Compounds (µg/kg)																
1,4-Dichlorobenzene	2,400	--	--	380 U	440 U	440 U	57 J	380 U	370 U	380 U	380 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
2-Butanone	2,800,000	--	5	10 B	15 B	15 B	13 R	8 B	8 B	14 B	9 B	7.3 K	6.2 U	9.2 U	31 U	7.8 U
Acetone	6,100,000	--	42	11 B	90	46	12 UJ	12 U	8 B	15 B	11 U	61 B	3.3 B	36 B	120 B	8.3 B
Benzene	1,100	--	--	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	0.51 K	2.5 U	3.7 U	12 U	3.1 U
Carbon disulfide	82,000	--	14	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	0.65 K	2.5 U	3.7 U	12 U	3.1 U
Chloromethane	12,000	--	--	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	8.9 K	3.1 U
Ethylbenzene	5,400	--	--	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	0.75 K	2.5 U	3.7 U	12 U	3.1 U
Isopropylbenzene	210,000	--	1	NA	NA	NA	NA	NA	NA	NA	NA	4.8 K	2.5 U	3.7 U	12 U	3.1 U
Methyl acetate	7,800,000	--	--	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	4.9 K	12 U	3.5 K
Methylene chloride	11,000	--	1	8 B	8 B	6 B	9 J	3 B	2 B	7 B	3 B	4.9 U	2.5 U	0.75 B	12 U	3.1 U
o-Xylene	69,000	--	--	NA	NA	NA	NA	NA	NA	NA	NA	4.5 K	2.5 U	3.7 U	12 U	3.1 U
Styrene	630,000	--	4	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	17 K	2.5 U	3.7 U	12 U	3.1 U
Tetrachloroethene	550	--	--	12 U	14 U	13 U	13 U	2 J	11 U	2 J	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Xylene, total	63,000	--	--	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	5 K	2.5 U	3.7 U	12 U	3.1 U
Semivolatile Organic Compounds (µg/kg)																
2,4-Dinitrotoluene	1,600	--	--	260 U	260 U	260 U	260 U	260 U	**2,100 J**	260 U	260 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	6,100	--	--	250 U	250 U	250 U	250 U	250 U	280 J	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	180,000	--	--	380 U	440 U	71 J	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Benzaldehyde	780,000	--	100	NA	NA	NA	NA	NA	NA	NA	NA	50 J	250 U	200 U	340 U	210 U
Benzo(a)anthracene	150	--	--	380 U	440 U	440 U	420 U	380 U	370 U	42 J	380 U	220 U	250 U	200 U	340 U	210 U
Benzo(b)fluoranthene	150	--	--	380 U	440 U	440 U	420 U	380 U	370 U	56 J	380 U	220 U	250 U	200 U	340 U	210 U
Benzo(k)fluoranthene	1,500	--	--	380 U	440 U	440 U	420 U	380 U	370 U	46 J	380 U	220 U	250 U	200 U	340 U	210 U
bis(2-Ethylhexyl)phthalate	35,000	--	670	380 U	48 J	650	2,000	380 U	370 U	76 J	83 J	720	250 U	100 J	1,400	1,300
Chrysene	15,000	--	--	380 U	440 U	440 U	420 U	380 U	370 U	50 J	380 U	220 U	250 U	200 U	340 U	210 U
Di-n-butylphthalate	610,000	--	--	46 J	51 J	440 U	82 J	58 J	48 J	380 U	54 J	320	250 U	200 U	340 U	210 U
Fluoranthene	230,000	--	--	380 U	440 U	440 U	420 U	380 U	370 U	88 J	380 U	220 U	250 U	200 U	340 U	210 U
n-Nitroso-di-n-propylamine	69	--	--	380 U	440 U	440 U	**93 J**	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
n-Nitrosodiphenylamine	99,000	--	--	380 U	440 U	440 U	93 J	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Pyrene	170,000	--	--	380 U	440 U	440 U	420 U	380 U	370 U	68 J	380 U	220 U	250 U	200 U	340 U	210 U
Pesticide/Polychlorinated Biphenyls (µg/kg)																
4,4'-DDD	2,000	--	3.1	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	2 J	1.5 J	4 UL
4,4'-DDE	1,400	--	3.9	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	1.7 J	3.8 L	4 UL
4,4'-DDT	1,700	--	--	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	4.9	14 J	4 UL
Aldrin	29	--	--	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	7.7 J	2.5 U	2 U	3.4 UL	2.1 UL
alpha-BHC	77	--	1.3	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	**460**	2.5 U	2 U	3.4 UL	2.1 UL
alpha-Chlordane	1,600	--	4.7	2 U	4.5 U	4.5 U	1,200 J	2 U	1.9 U	2 UL	2 U	2.2 U	2.5 U	3.4	1.8 J	2.1 UL
Aroclor-1254	110	--	--	38 U	**770 J**	**12,000 J**	**79,000**	38 U	37 U	38 UL	38 U	**5,100**	25 U	20 U	34 U	21 UL
Aroclor-1260	220	--	--	38 U	**340**	**4,900**	1,700 U	38 U	37 U	38 UL	38 U	**590**	25 U	20 U	61 J	21 UL
beta-BHC	270	--	0.99	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	1.6 L	2 U	5.5 U	2.5 U	2 U	3.4 UL	0.52 J
delta-BHC	270	--	0.80	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	26	2.5 U	2 U	3.4 UL	2.1 UL
Dieldrin	30	--	2.5	3.8 U	7.3 J	**90 J**	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	0.53 B	5.8 L	4 UL
Endosulfan II	37,000	--	--	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	3.8 U	1.5 J	4 UL
Endosulfan sulfate	37,000	--	2.7	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.6 L	3.8 U	4.2 U	4.9 U	3.8 U	6.6 UL	4 UL
Endrin	1,800	--	--	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	3.8 U	1.8 J	4 UL
Endrin aldehyde	1,800	--	2.7	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 UL	4.9 UL	3.8 UL	0.85 J	4 UL
gamma-Chlordane	1,600	--	--	2 U	4.5 U	37 J	87 U	2 U	1.9 U	2 UL	2 U	2.2 U	2.5 U	2.2	1.3 J	2.1 UL
Heptachlor	110	--	--	2 U	4.5 U	170 R	87 U	2 U	1.9 U	2 UL	2 U	**200**	2.5 U	2 U	3.4 UJ	2.1 UL
Heptachlor epoxide	53	--	--	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	2.2 U	2.5 U	2 U	0.88 J	2.1 UL
Methoxychlor	31,000	--	--	20 U	45 U	45 U	870 U	20 U	19 U	20 UL	20 U	5.3 J	25 U	20 U	34 UL	21 UL
Explosives (µg/kg)																
1,3,5-Trinitrobenzene	220,000	--	--	250 U	250 U	250 U	450 UJ	250 U	450 J	250 U	250 U	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL
2,4,6-Trinitrotoluene	3,600	--	--	250 U	250 U	250 U	250 U	250 U	**4,100 J**	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U

TABLE 4-4

Soil Debris/Subsurface Soil Data Exceedance Results

Inside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**Yorktown 95 % UTL Background - Subsurface Soil**	**Yorktown Maximum Background - Subsurface Soil**	A06TP01	A06TP02		A06TP03	A06TP04	A06TP05	A06TP06		YS24-SB14	YS24-SB15	YS24-SB20	YS24-SB20B	YS24-SB121
Sample ID				A06TP01-02	A06TP02-01	A06TP02-02	A06TP03-02	A06TP04-02	A06TP05-02	A06TP06-01	A06TP06-02	YS24-SB14-10-11-0410	YS24-SB15-7-8-0410	YS24-SB20-7-8-0410	YS24-SB20B-7-8-0410	YS24-SB121-0410-SO
Sample Date				11/16/94	11/16/94	11/16/94	11/17/94	11/15/94	11/15/94	11/15/94	11/15/94	04/21/10	04/21/10	04/20/10	04/20/10	04/22/10
Depth				2-3'	1-9'	9-10'	4-4.5'	3-4'	2-3'	2-3'	4-6'	10-11'	7-8'	7-8'	7-8'	4-5'
Chemical Name																
Total Metals (mg/kg)																
Aluminum	7,700	13,000	18,400	3,570	7,360	3,340	**9,270**	3,390	7,320	4,640	4,130	**13,200**	**14,500**	5,980	**344,000**	**20,200**
Antimony	3.1	--	--	2.7 R	3.2 R	3.2 R	3.1 UL	2.7 R	2.6 UL	2.7 R	2.8 UL	0.6 J	0.54 J	1.1 U	1.9 U	1 J
Arsenic	0.39	5.54	18.6	**0.79 K**	**4.5**	**5.6**	**3.4**	**1.1 K**	**1.7**	**1.2 K**	**1.4**	2.4 B	**5.2**	1.7 B	1.9 U	1.2 U
Barium	1,500	84.5	58.0	15.7	32.2	31.3	327	24.2	31.3	31.1	30.4	40.1	**27.7 J**	22.5 J	23.3 J	43.1
Beryllium	16	--	0.57	0.22 U	0.31	0.36	0.2	0.22 U	0.19	0.22 U	0.16	0.22 B	0.21 B	0.17 B	0.27 B	0.61 U
Cadmium	7	--	--	0.33 U	**101**	**7.3**	**51.9**	0.33 U	0.32 U	3.8	2.1	**575**	0.24 B	2.6	5.2	0.75
Calcium	--	2,380	162,000	539	3,610	196,000	953	509	797	494	432	2,050	2,530	326 J	5,710	5,990
Chromium	0.29	33.7	37.5	**5.6 L**	**22.8 L**	**8.1 L**	**28.3**	**4.3 L**	**7.7**	**6.1 L**	**5.8**	**21.8**	**45.6**	**10.7**	**64.6**	**21.7**
Cobalt	2.3	5.18	7.3	0.64	**3.8**	**3.4**	**7.9**	0.65	1.1	1.1	1.3	**4.5**	1.2	0.62	0.21 B	**10.8**
Copper	310	3.17	9.6	1.9	14.8	44.5	181	0.72	1.6	16.8	23	122	9.4	4.9	**15,600**	75.2
Iron	5,500	32,000	31,700	2,920 J	**16,500 J**	**14,800 J**	**12,400**	2,480 J	4,750	3,590 J	3,510	**17,100**	**19,400**	5,000	3,180	**21,300**
Lead	400	8.79	83.7	3.6	26.8	33.9	182	3.1	7.6	10.2	16	34	11.1	11.7	54.2	35.4
Magnesium	--	1,120	4,630	250	1,050	2,020	538	128	348	272	270	609 J	2,520	452 J	4,200	5,090
Manganese	180	176	284	8.8 J	45.6 J	144 J	41.7	10.1 J	21.8	52 J	76.8	89.6	13.8	36.1	**2,860**	126
Mercury	2.3	--	0.14	0.12 UL	0.13 UL	0.12 UL	0.12 U	0.1 UL	0.11 U	0.3 L	0.15	0.069 B	0.043 B	0.11 B	0.097 B	0.04 U
Nickel	150	17.6	11.0	1.4	13.7	12.9	62	1.4	2.7	1.2	1.5	44.8	2.9	2.1	17.5	10.9
Potassium	--	901	4,240	313	1,170	772	540	159	221	351	325	599 J	2,420	807	150 J	611 J
Silver	39	--	1.1	0.44 U	0.52 U	0.53 U	1.9	0.44 U	0.43 U	0.45 U	0.46 U	0.21 B	0.7 U	0.59	1.3	0.61 U
Sodium	--	811	10,400	19.6	48.1	1,170	51.4	64.4	72.8	20.4	73.5	108 J	172 J	113 J	164 J	485 J
Vanadium	39	48.3	53.8	8.4	18.2	7.6	16.2	6.5	12.3	8.4	7.3	17.2	31	14.8	29.1	**89.4**
Zinc	2,300	28	52.9	6 J	618 J	100 J	1,580	7.9 J	18.1	40.3 J	44	603	14.6	287	606	72.1
Wet Chemistry																
pH (ph)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	7.25	6.8	5.32	7.7	NA
Total organic carbon (TOC) (mg/kg)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	6,659	4,254	2,657	4,571	NA
Grain Size (pct/p)																
Sieve No. 004 (4.75 mm)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	98.1	93.7	100	NA	NA
Sieve No. 010 (2.00 mm)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	89.4	63.4	94.8	NA	NA
Sieve No. 020 (850 um)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	76.2	42.5	84.2	NA	NA
Sieve No. 040 (425 um)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	64.6	29.2	72.6	NA	NA
Sieve No. 060 (250 um)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	37.1	21.5	41.5	NA	NA
Sieve No. 080 (180 um)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	18.6	14.9	14.3	NA	NA
Sieve No. 100 (150 um)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	15.6	13.7	9.9	NA	NA
Sieve No. 230 (63-UM)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	1.8	1.7	0.7	NA	NA
Sieve No. 200 (75 um)	--	--		NA	NA	NA	NA	NA	NA	NA	NA	2.7	2.6	1.4	NA	NA

Notes:

Green text indicates exceedance of Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-5

Subsurface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95 % UTL Background - Subsurface Soil	Yorktown Maximum Background - Subsurface Soil	A06SB03				A06SB04			A06SB05				A06SB06			
Sample ID					A06SB03-01	A06SB03-01D	A06SB03-07	A06SB03-05	A06SB04-01	A06SB04-08	A06SB04-05	A06SB05-01	A06SB05-06	A06SB05-05	A06SB05-05D	A06SB06-01	A06SB06-06	A06SB06-04	A06SB06-04D
Sample Date					11/15/94	11/15/94	11/15/94	11/15/94	11/04/94	11/04/94	11/04/94	11/08/94	11/08/94	11/08/94	11/08/94	11/06/94	11/06/94	11/06/94	11/06/94
Depth					1-3'	1-3'	13-15'	9-11'	1-3'	15-17'	9-11'	1-3'	11-13'	9-11'	9-11'	1-3'	11-13'	7-9'	7-9'
Chemical Name																			
Volatile Organic Compounds (µg/kg)																			
1,2,4-Trichlorobenzene	6,200	1270	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
2-Butanone	2,800,000	--	--	5	11 B	88	12 B	14 B	12 U	13 U	13 U	13 U	9 J	13 U	15 U	12 U	11 U	12 R	11 U
Acetone	6,100,000	--	--	42	15 B	8 B	23 B	11 B	12 U	13 U	13 U	13 U	5 B	13 U	15 U	12 U	11 U	2 J	3 J
Carbon disulfide	82,000	--	--	14	11 U	11 U	2 J	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U
Chloromethane	12,000	5,000	--	--	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U
Ethylbenzene	5,400	1,815	--	--	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U
Methyl acetate	7,800,000	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	11,000	1,250	--	1	4 B	3 B	6 B	8 B	12 U	13 U	13 U	13 U	4 J	24	40	3 J	11 U	12 U	11 U
Semivolatile Organic Compounds (µg/kg)																			
2,4-Dinitrotoluene	1,600	11,000	--	--	260 U	260 U	260 U	260 U	0.26 U	260 U	260 U	430	260 U	680	450	260 U	260 U	260 U	260 U
2,6-Dinitrotoluene	6,100	8,500	--	--	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	500	250 U	730	250 U	250 U	250 U	250 U	250 U
Benzo(a)anthracene	150	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Benzo(a)pyrene	15	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Benzo(b)fluoranthene	150	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Benzo(g,h,i)perylene	170,000	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Benzo(k)fluoranthene	1,500	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
bis(2-Ethylhexyl)phthalate	35,000	30,000	--	670	380 U	380 U	380 J	45 J	55 J	50 J	430 U	470	91 J	440 U	480 U	58 J	62 J	140 J	68 J
Butylbenzylphthalate	260,000	30,000	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	1,200	360 U
Chrysene	15,000	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Dibenz(a,h)anthracene	15	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Di-n-butylphthalate	610,000	40,000	--	--	49 J	380 U	59 J	63 J	340 J	230 J	330 J	64 J	210 J	55 J	150 J	400	240 J	2,100	330 J
Fluoranthene	230,000	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Indeno(1,2,3-cd)pyrene	150	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Phenanthrene	1,700,000	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Pyrene	170,000	--	--	--	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U
Pesticide/Polychlorinated Biphenyls (µg/kg)																			
4,4'-DDD	2,000	583	--	3.1	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	1.3 L	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ
4,4'-DDE	1,400	114	--	3.9	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	2.2 L	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ
4,4'-DDT	1,700	100	--	--	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	1.4 L	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ
alpha-BHC	77	226	--	1.3	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	1.9 L	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ
alpha-Chlordane	1,600	11.0	--	4.7	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ
beta-BHC	270	342	--	0.99	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	1.1 L	1.9 U	5.4	3.2 J	1.9 UJ	1.9 U	2 U	1.8 UJ
delta-BHC	270	226	--	0.80	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ
Dieldrin	30	10.5	--	2.5	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	1.7 L	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ
Endosulfan I	37,000	6.32	--	2.3	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	1.3 J	1.5 J	1.9 UJ	1.9 U	2 U	1.8 UJ
Endrin	1,800	1.95	--	--	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	4.4 R	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ
Endrin aldehyde	1,800	1.95	--	2.7	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	4.4 R	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ
gamma-Chlordane	1,600	11.0	--	--	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ
Explosives (µg/kg)																			
1,3,5-Trinitrobenzene	220,000	--	--	--	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	660	250 U	1,200	250 U	250 U	250 U	250 U	250 U
2,4,6-Trinitrotoluene	3,600	10,000	--	--	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	1,200	250 U	3,400	1,500	250 U	250 U	250 U	250 U
4-Amino-2,6-dinitrotoluene	15,000	80,000	--	--	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	250 U	250 U	370	280	250 U	250 U	250 U	250 U
Total Metals (mg/kg)																			
Aluminum	7,700	pH < 5.5	13,000	18,400	4,090	4,880	3,310	6,760	5,710	2,350	4,490	5,140	6,810	4,090	**8,180**	2,670	**9,170**	5,346	4,140
Antimony	3.1	78.0	--	--	2.8 UL	2.8 UL	3.2 R	3 R	2.7 UL	3 UL	3.1 UL	3.3 UL	**4.6 L**	3.2 R	3.4 R	2.7 UL	2.7 UL	2.9 UL	2.6 UL
Arsenic	0.39	18.0	5.54	18.6	**1.9**	**1.4**	**5.8**	**9.2**	**1.4**	**5.7**	**13.6**	**1.6**	**9.4**	**12.2**	**9.7**	**1**	**16.5**	**49.5**	**5.1**
Barium	1,500	330	84.5	58.0	28	29.2	19.7	25.9	20.2	13.5	14.3	40	14.1	9.4	16.7	23.6	22.5	10.3	8.9
Beryllium	16	40.0	--	0.57	0.21	0.24	0.27	0.57	0.07 K	0.18 K	0.15 K	0.23 B	0.89 B	0.26 U	0.28 U	0.09	0.56	0.15	0.12
Cadmium	7	32.0	--	--	0.34 U	0.35 U	0.4 U	0.37 U	0.34 U	0.37 U	0.38 U	0.85	0.32 U	0.42 B	0.42 U	0.51 K	0.33 U	0.35 U	0.32 U
Calcium	--	--	2,380	162,000	386	326	202,000	1,770	445	23,000	2,440	413	5,020	1,160	1,550	224	62,400	793	642
Chromium	0.29	64.0	33.7	37.5	**6**	**6.1**	**11.3 L**	**20.5 L**	**6.1**	**7**	**22.1**	**6.4**	**25.3**	**21.3 L**	**30.9 L**	**3**	**21.9**	**28.6**	**11.1**
Cobalt	2.3	13.0	5.18	7.3	**4.4**	**4.7**	**2.7**	**6.5**	0.9	**3**	2.2	1.4	**12.3**	1.5	2	0.81	**4**	1.2	0.8

TABLE 4-5

Subsurface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95 % UTL Background - Subsurface Soil	Yorktown Maximum Background - Subsurface Soil	A06SB03				A06SB04			A06SB05				A06SB06			
Sample ID					A06SB03-01	A06SB03-01D	A06SB03-07	A06SB03-05	A06SB04-01	A06SB04-08	A06SB04-05	A06SB05-01	A06SB05-06	A06SB05-05	A06SB05-05D	A06SB06-01	A06SB06-06	A06SB06-04	A06SB06-04D
Sample Date					11/15/94	11/15/94	11/15/94	11/15/94	11/04/94	11/04/94	11/04/94	11/08/94	11/08/94	11/08/94	11/08/94	11/06/94	11/06/94	11/06/94	11/06/94
Depth					1-3'	1-3'	13-15'	9-11'	1-3'	15-17'	9-11'	1-3'	11-13'	9-11'	9-11'	1-3'	11-13'	7-9'	7-9'
Chemical Name																			
Copper	310	70.0	3.17	9.6	1.9	1.8	3.9	8	2.1	3.7	7.7	23.3	7.3	7.2	6.9	2.8 B	6.8	3.9	3.3 B
Total Metals cont. (mg/kg)																			
Cyanide	160	15.8	--	2.7	2.9 U	2.9 U	3.3 U	3.2 U	2.9 U	3.1 U	3.2 U	3.4 UL	2.8 UL	3.3 U	3.6 U	2.8 UL	2.8 UL	3 UL	3.5 L
Iron	5,500	5 < pH > 8	32,000	31,700	**5,920**	4,830	**11,300 J**	**21,700 J**	4,150	**10,700**	**22,300**	3,340	**35,800**	**17,200 J**	**16,700 J**	1,720	**19,800**	**11,500**	4,900
Lead	400	120	8.79	83.7	4.8	5.3	4.5	9.4	6.3	3.9	9.1	11.8	7.7	9.4	8.9	4.7	6.9	9	4.7
Magnesium	--	--	1,120	4,630	320	407	2,150	2,110	318	1,860	719	286	1,160	710	1,410	185	1,390	491	426
Manganese	180	220	176	284	61.6	68.3	96.5 J	51.8 J	14.4	102	8.2	42.2	50.3	5 J	9.5 J	32.5	79.4	4.8	4.7
Mercury	2.3	0.10	--	0.14	0.11 U	0.11 U	0.12 UL	0.12 UL	0.11 UL	0.11 UL	0.13 UL	0.56 K	0.1 UL	0.13 UL	0.13 UL	0.11 UL	0.11 UL	0.11 UL	0.1 UL
Nickel	150	38.0	17.6	11	3	3.8	3.9	10.7	1.2	5.8	1.1 U	3.6 B	26.7	1.1 U	1.6	1.2	7.5	1.6	2.7
Potassium	--	--	901	4,240	283	274	934	1,250	236	760	759	251	1,010	854	1,580	210 B	1,140	873	789
Silver	39	560	--	1.1	0.46 U	1.2	0.53 U	0.49 U	0.45 U	0.49 U	0.51 U	0.54 U	0.42 U	0.52 U	0.57 U	0.45 U	0.44 U	0.47 U	0.43 U
Sodium	--	--	811	10,400	73.9	79.4	1,440	42.4	25.9	1,310	43.4	77.7	77.1	91.2	102	19.8	246	72.6	23
Thallium	--	1.00	--	--	0.92 UL	0.92 UL	1.1 U	0.97 U	0.9 UL	0.99 UL	1 UL	1.1 U	0.85 U	1 U	1.1 U	0.9 UL	0.88 UL	0.94 UL	0.86 UL
Vanadium	39	130	48.3	53.8	10.4	9.5	10.9	17.8	9.7	5.1	27.6	8.1	23.4	26	28.9	4.5	25.7	**99.3**	17.9
Zinc	2,300	120	28	52.9	10.6	13.5	23.1 J	39.6 J	10.1 J	14.6 J	9.5 J	61.1 J	76 J	10.1 J	17.4 J	6.4 J	23.9 J	6.1 J	5 J
Wet Chemistry																			
pH (ph)	--	--	--		5.54	5.52	8.11	5.39	5.8	8.75	6.4	5.48	7.27	6.29	8.36	5.57	7.42	6.47	5.71
Total organic carbon (TOC) (mg/kg)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size (pct/p)																			
Sieve No. 004 (4.75 mm)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 230 (63-UM)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	--	--	--		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Blue text indicates exceedance of ECO SVs at depths less than 2 feet* (samples collected at depth intervals larger than 2 feet were not compared to ECO criteria)

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text inidcated exceedance of both ECO SVs and Adjusted Residential Soil RSLs

*Samples shaded in yellow were collected at depths less than 2 feet

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-5

Subsurface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95 % UTL Background - Subsurface Soil	A06SB10			YS24-SO01	YS24-SO02		YS24-SO03	YS24-GW/SO04	YS24-GW/SO05
Sample ID				A06SB10-01	A06SB10-07	A06SB10-05	YS24-SB01-0.5-2-0410	YS24-SB02-0.5-2-0410	YS24-SB02P-0.5-2-0410	YS24-SB03-0.5-2-0410	YS24-SB04-0.5-2-0410	YS24-SB05-0.5-2-0410
Sample Date				11/08/94	11/08/94	11/08/94	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10	04/15/10
Depth				1-3'	13-15'	9-11'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'
Chemical Name												
Volatile Organic Compounds (µg/kg)												
1,2,4-Trichlorobenzene	6,200	1270	--	370 U	400 U	450 U	3.6 U	3.8 U	6.1 U	3.6 U	5 UL	3.6 UJ
2-Butanone	2,800,000	--	--	12 U	12 U	14 U	6.5 K	4.2 B	10 K	3.4 B	5.6 K	4.8 B
Acetone	6,100,000	--	--	12 U	9 J	14 U	54 B	9.4 U	85 B	35 B	44 B	29 B
Carbon disulfide	82,000	--	--	12 U	12 U	14 U	3.6 U	3.8 U	6.1 U	3.6 U	1.9 K	3.6 U
Chloromethane	12,000	5,000	--	12 U	12 U	14 U	3.6 U	3.8 U	0.66 K	3.6 U	5 U	3.6 U
Ethylbenzene	5,400	1,815	--	12 U	12 U	14 U	3.6 U	3.8 U	6.1 U	3.6 U	2.8 K	1.1 K
Methyl acetate	7,800,000	--	--	NA	NA	NA	3.6 U	650 K	680 K	3.6 U	5 U	3.6 U
Methylene chloride	11,000	1,250	--	8 J	25	18	0.42 B	1.5 B	0.85 B	3.6 U	0.65 B	0.36 B
Semivolatile Organic Compounds (µg/kg)												
2,4-Dinitrotoluene	1,600	11,000	--	260 U	260 U	260 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	6,100	8,500	--	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
Benzo(a)anthracene	150	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	36 J	39 J
Benzo(a)pyrene	15	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	**180 J**	**44 J**
Benzo(b)fluoranthene	150	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	**300**	64 J
Benzo(g,h,i)perylene	170,000	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	130 J	41 J
Benzo(k)fluoranthene	1,500	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	260	65 J
bis(2-Ethylhexyl)phthalate	35,000	30,000	--	370 U	61 J	65 J	190 U	180 U	180 U	190 U	200 U	190 U
Butylbenzylphthalate	260,000	30,000	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	200 U	190 U
Chrysene	15,000	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	110 J	68 J
Dibenz(a,h)anthracene	15	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	**45 J**	190 U
Di-n-butylphthalate	610,000	40,000	--	45 J	80 J	130 J	190 U	180 U	180 U	190 U	200 U	190 U
Fluoranthene	230,000	--	--	370 U	400 U	450 U	190 U	180 U	34 J	190 U	62 J	90 J
Indeno(1,2,3-cd)pyrene	150	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	150 J	190 U
Phenanthrene	1,700,000	--	--	370 U	400 U	450 U	190 U	180 U	180 U	190 U	200 U	25 J
Pyrene	170,000	--	--	370 U	400 U	450 U	190 U	180 U	34 J	190 U	120 J	81 J
Pesticide/Polychlorinated Biphenyls (µg/kg)												
4,4'-DDD	2,000	583	--	3.7 U	4 U	4.5 U	3.7 U	3.6 UL	3.6 UL	3.7 UL	3.8 UL	3.7 UJ
4,4'-DDE	1,400	114	--	3.7 U	4 U	4.5 U	3.7 U	3.6 UL	3.6 UL	3.7 UL	3.8 UL	0.77 J
4,4'-DDT	1,700	100	--	3.7 U	4 U	4.5 U	1 J	3.6 UL	0.57 J	3.7 UL	3.8 UL	3.7 UJ
alpha-BHC	77	226	--	1.9 U	2.1 U	2.3 U	1.9 U	1.8 UL	1.8 UL	1.9 UL	2 UL	1.9 UJ
alpha-Chlordane	1,600	11.0	--	1.9 U	2.1 U	2.3 U	1.9 U	1.8 UL	0.25 J	1.9 UL	2 UL	1.9 UJ
beta-BHC	270	342	--	1.9 U	2.1 U	2.3 U	0.95 U	0.93 UL	0.93 UL	0.95 UL	0.99 UL	1.9 UJ
delta-BHC	270	226	--	1.9 U	2.1 U	2.3 U	1.9 U	1.8 UL	1.8 UL	1.9 UL	2 UL	1.9 UJ
Dieldrin	30	10.5	--	3.7 U	4 U	4.5 U	3.7 U	3.6 UL	3.6 UL	3.7 UL	3.8 UL	3.7 UJ
Endosulfan I	37,000	6.32	--	1.9 U	2.1 U	2.3 U	1.9 U	1.8 UL	1.8 UL	1.9 UL	2 UL	1.9 UJ
Endrin	1,800	1.95	--	3.7 U	4 U	4.5 U	0.38 J	3.6 UL	3.6 UL	3.7 UL	3.8 UL	3.7 UJ
Endrin aldehyde	1,800	1.95	--	3.7 U	4 U	4.5 U	0.4 J	0.37 L	3.6 UL	3.7 UL	0.66 L	0.6 J
gamma-Chlordane	1,600	11.0	--	1.9 U	2.1 U	2.3 U	1.9 U	0.2 L	0.31 J	1.9 UL	0.25 J	1.9 UJ
Explosives (µg/kg)												
1,3,5-Trinitrobenzene	220,000	--	--	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 UL
2,4,6-Trinitrotoluene	3,600	10,000	--	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
4-Amino-2,6-dinitrotoluene	15,000	80,000	--	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Total Metals (mg/kg)												
Aluminum	7,700	pH < 5.5	13,000	3,960	4,820	6,120	6,410	5,890	5,890	**7,930**	6,860	6,300
Antimony	3.1	78.0	--	2.7 R	2.9 R	3.2 R	0.37 J	1.1 U	0.32 J	1.1 U	1.5	1.1 U
Arsenic	0.39	18.0	5.54	**2.4 K**	**8**	**8.9**	**0.94 J**	**0.74 J**	**0.57 J**	**0.63 J**	**113**	1.1 B
Barium	1,500	330	84.5	35.6	19.9	27	38.1	38.3	38.4	28.1	33.6	19.5 J
Beryllium	16	40.0	--	0.35	0.39	0.63	0.31 J	0.27 J	0.34 J	0.13 B	0.78	0.39 J
Cadmium	7	32.0	--	0.33 U	0.36 U	0.39 U	0.34 J	0.45 J	0.35 J	0.04 J	0.9	0.58
Calcium	--	--	2,380	374	58,900	2,170	683	658	593	416 J	34,200	11,600
Chromium	0.29	64.0	33.7	**5.6 L**	**17.1 L**	**18 L**	**7.4**	**8.6**	**5.5**	**8.2**	**16.2**	**7.4**
Cobalt	2.3	13.0	5.18	**6.8**	**4.6**	**7.3**	1.6	1.5	1.5	0.97	**3.7**	1.5

TABLE 4-5

Subsurface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**ECO Screening Value**	**Yorktown 95 % UTL Background - Subsurface Soil**	A06SB10			YS24-SO01	YS24-SO02		YS24-SO03	YS24-GW/SO04	YS24-GW/SO05
Sample ID				A06SB10-01	A06SB10-07	A06SB10-05	YS24-SB01-0.5-2-0410	YS24-SB02-0.5-2-0410	YS24-SB02P-0.5-2-0410	YS24-SB03-0.5-2-0410	YS24-SB04-0.5-2-0410	YS24-SB05-0.5-2-0410
Sample Date				11/08/94	11/08/94	11/08/94	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10	04/15/10
Depth				1-3'	13-15'	9-11'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'
Chemical Name												
Copper	310	70.0	3.17	10.6	6	8.9	4.1	5.1	5.7	1.3	4.5	4.7
Total Metals cont. (mg/kg)												
Cyanide	160	15.8	--	2.8 U	3 U	3.4 U	0.54 U	0.52 U	0.52 U	0.55 U	0.58 U	0.55 U
Iron	5,500	5 < pH > 8	32,000	**6,380 J**	**15,300 J**	**21,200 J**	4,730	3,630	3,130	4,930	**12,900**	**6,250**
Lead	400	120	8.79	15.3	6.8	9.4	15.4	9.4	7.9	7.1	18	11.1
Magnesium	--	--	1,120	281	1,900	1,890	350 J	324 J	311 J	454 J	1,310	946
Manganese	180	220	176	151 J	113 J	54.5 J	106	109	93.8	17.9	97.7	113
Mercury	2.3	0.10	--	0.11 UL	0.12 UL	0.12 UL	0.045	0.024 J	0.025 J	0.018 J	0.038 U	0.018 J
Nickel	150	38.0	17.6	4.9	7	13.4	3.5	2.8	2.7	2.6	5.6	2.6
Potassium	--	--	901	162	1,120	1,010	337 J	254 J	234 J	312 J	1,830	487 J
Silver	39	560	--	0.44 U	0.48 U	0.52 U	0.56 U	0.53 U	0.53 U	0.55 U	0.58 U	0.55 U
Sodium	--	--	811	70.5	425	37	176 J	160 J	138 J	168 J	404 J	178 J
Thallium	--	1.00	--	0.88 U	0.96 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2 U	1.1 U
Vanadium	39	130	48.3	9.6	15.5	16.8	11.6	10.7	9.4	13.7	19.6	12.3
Zinc	2,300	120	28	26.4 J	31.9 J	45.7 J	32	34.9	32.8	7.9	26.1	26.4
Wet Chemistry												
pH (ph)	--	--	--	5.45	7.65	5.63	7.2	7.12	NA	5.76	7.93	8.23
Total organic carbon (TOC) (mg/kg)	--	--	--	NA	NA	NA	8,265	6,827	NA	2,771	3,655	7,269
Grain Size (pct/p)												
Sieve No. 004 (4.75 mm)	--	--	--	NA	NA	NA	89.5	99	NA	99.8	97	95.9
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	NA	80.4	93.2	NA	90.9	87.8	88.1
Sieve No. 020 (850 um)	--	--	--	NA	NA	NA	65.5	79.3	NA	72.2	73.9	69.3
Sieve No. 040 (425 um)	--	--	--	NA	NA	NA	46.1	62.7	NA	54.2	59.5	50.4
Sieve No. 060 (250 um)	--	--	--	NA	NA	NA	26.4	38.8	NA	21.1	37.1	29
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	13.6	20.8	NA	8.7	15.6	16.4
Sieve No. 100 (150 um)	--	--	--	NA	NA	NA	10.4	16.2	NA	6.9	12	13.1
Sieve No. 230 (63-UM)	--	--	--	NA	NA	NA	1.4	5.3	NA	0.4	2.5	1.6
Sieve No. 200 (75 um)	--	--	--	NA	NA	NA	2.2	6.2	NA	0.6	3.5	3

Notes:

Blue text indicates exceedance of ECO SVs at depths less than 2 feet* (samples collected at depth intervals larger than 2 feet were not compared to ECO criteria)

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text inidcated exceedance of both ECO SVs and Adjusted Residential Soil RSLs

*Samples shaded in yellow were collected at depths less than 2 feet

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-5

Subsurface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**ECO Screening Value**	**Yorktown 95 % UTL Background - Subsurface Soil**	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-SB10	YS24-SB11	YS24-SB12		YS24-SB13	YS24-SB16	YS24-SB17
Sample ID				YS24-SB06-0.5-2-0410	YS24-SB07-0.5-2-0410	YS24-SB08-0.5-2-0410	YS24-SB10-5-6-0410	YS24-SB11-5-6-0410	YS24-SB12-5-6-0410	YS24-SB12P-5-6-0410	YS24-SB13-5-6-0410	YS24-SB16-5-6-0410	YS24-SB17-5-6-0410
Sample Date				04/15/10	04/19/10	04/15/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/20/10
Depth				0.5-2'	0.5-2'	0.5-2'	5-6'	5-6'	5-6'	5-6'	5-6'	5-6'	5-6'
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,2,4-Trichlorobenzene	6,200	1270	--	3.4 U	3.5 U	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U
2-Butanone	2,800,000	--	--	2.7 B	3.4 B	14 U	9 U	11 U	7.9 U	8.7 U	8.7 U	2.2 B	8.2 U
Acetone	6,100,000	--	--	32 B	35 B	11 B	9 U	16 B	9.7 B	11 B	8.7 U	24 B	10 B
Carbon disulfide	82,000	--	--	2.8 K	3.5 U	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U
Chloromethane	12,000	5,000	--	3.4 U	3.5 U	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U
Ethylbenzene	5,400	1,815	--	3.4 U	3.5 U	3.1 J	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U
Methyl acetate	7,800,000	--	--	14 K	35 K	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	35 K	3.3 U
Methylene chloride	11,000	1,250	--	0.37 B	3.5 U	0.71 B	0.47 B	0.8 B	3.2 U	0.39 B	3.5 U	3.2 U	2.6 B
Semivolatile Organic Compounds (µg/kg)													
2,4-Dinitrotoluene	1,600	11,000	--	1,500 U	1,500 U	1,500 U	1,500 U	97 J	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	6,100	8,500	--	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
Benzo(a)anthracene	150	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Benzo(a)pyrene	15	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Benzo(b)fluoranthene	150	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Benzo(g,h,i)perylene	170,000	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Benzo(k)fluoranthene	1,500	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
bis(2-Ethylhexyl)phthalate	35,000	30,000	--	61 J	190 U	170 J	160 J	250 U	200 U	200 U	200 U	190 U	120 J
Butylbenzylphthalate	260,000	30,000	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Chrysene	15,000	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Dibenz(a,h)anthracene	15	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Di-n-butylphthalate	610,000	40,000	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Fluoranthene	230,000	--	--	25 J	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Indeno(1,2,3-cd)pyrene	150	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Phenanthrene	1,700,000	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Pyrene	170,000	--	--	200 U	190 U	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	2,000	583	--	4 UL	3.7 U	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U
4,4'-DDE	1,400	114	--	4 UL	3.7 U	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U
4,4'-DDT	1,700	100	--	0.99 L	3.7 U	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U
alpha-BHC	77	226	--	2 UL	1.9 U	2.1 UL	2.3 U	2.5 U	0.22 J	2 U	2 U	1.9 U	2 U
alpha-Chlordane	1,600	11.0	--	0.26 J	0.49 J	2.1 UL	0.3 J	2.5 U	2 U	2 U	2 U	1.9 U	2 U
beta-BHC	270	342	--	1 UL	1.9 U	1.1 UL	2.3 U	1 J	2 U	2 U	1 U	1.9 U	2 U
delta-BHC	270	226	--	2 UL	0.25 J	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U
Dieldrin	30	10.5	--	4 UL	3.7 U	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U
Endosulfan I	37,000	6.32	--	2 UL	1.9 U	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U
Endrin	1,800	1.95	--	4 UL	3.7 U	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U
Endrin aldehyde	1,800	1.95	--	4 UL	3.7 UL	4.1 UL	4.4 UL	4.8 UL	3.9 UL	3.9 UL	4 UL	3.7 UL	3.8 UL
gamma-Chlordane	1,600	11.0	--	0.43 L	0.24 J	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U
Explosives (µg/kg)													
1,3,5-Trinitrobenzene	220,000	--	--	1,500 U	1,500 UL	1,500 U	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL
2,4,6-Trinitrotoluene	3,600	10,000	--	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
4-Amino-2,6-dinitrotoluene	15,000	80,000	--	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Total Metals (mg/kg)													
Aluminum	7,700	pH < 5.5	13,000	7,470	**4,330**	5,340	**11,200**	**12,400**	**10,900**	**12,100**	**12,400**	**10,800**	**9,630**
Antimony	3.1	78.0	--	0.66 L	1.1 U	0.55 J	0.76 J	0.99 J	0.37 J	0.33 J	0.39 J	1.1 U	1.2 U
Arsenic	0.39	18.0	5.54	**3.9**	1.1 U	**5.3**	**15.7**	**22.3**	1.4 B	0.81 B	**5.9**	1.2 B	1.1 B
Barium	1,500	330	84.5	32.4	29.4	28.2	15.6 J	27.3 J	30	32.1	26.7	43.4	22.2 J
Beryllium	16	40.0	--	0.49 J	0.18 B	0.34 J	0.29 J	0.14 B	0.13 B	0.1 B	0.12 B	0.14 B	0.13 B
Cadmium	7	32.0	--	0.33 J	0.55 U	0.35 J	0.22 B	0.38 J	0.58 U	0.56 U	0.21 B	0.55 U	0.58 U
Calcium	--	--	2,380	3,690	191 J	212,000	1,410	1,410	848	995	1,490	445 J	865
Chromium	0.29	64.0	33.7	**17.6**	**4.4**	**14.7**	**37.8**	**43.4**	**12.9**	**13.6**	**23.4**	**11.2**	**14.7**
Cobalt	2.3	13.0	5.18	**3.8**	0.92	2.3	1	0.91	0.89	1	1.2	1.4	0.85

TABLE 4-5

Subsurface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95 % UTL Background - Subsurface Soil	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-SB10	YS24-SB11	YS24-SB12		YS24-SB13	YS24-SB16	YS24-SB17
Sample ID				YS24-SB06-0.5-2-0410	YS24-SB07-0.5-2-0410	YS24-SB08-0.5-2-0410	YS24-SB10-5-6-0410	YS24-SB11-5-6-0410	YS24-SB12-5-6-0410	YS24-SB12P-5-6-0410	YS24-SB13-5-6-0410	YS24-SB16-5-6-0410	YS24-SB17-5-6-0410
Sample Date				04/15/10	04/19/10	04/15/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/20/10
Depth				0.5-2'	0.5-2'	0.5-2'	5-6'	5-6'	5-6'	5-6'	5-6'	5-6'	5-6'
Chemical Name													
Copper	310	70.0	3.17	5.7	1.6	3.7	7.1	7.5	1.3	1.4	5.9	1.5	1.7
Total Metals cont. (mg/kg)													
Cyanide	160	15.8	--	0.59 U	0.53 U	0.62 U	0.66 U	0.72 U	0.59 U	0.58 U	0.57 U	0.56 U	0.58 U
Iron	5,500	5 < pH > 8	32,000	**14,700**	2,400	**11,100**	**27,700**	**34,100**	**6,550**	**7,080**	**13,000**	**6,370**	**6,930**
Lead	400	120	8.79	11.4	6.8	7.2	9	12.7	7.5	7.7	9.9	7.6	7.3
Magnesium	--	--	1,120	1,200	270 J	2,790	1,870	1,140	538 J	566	877	519 J	652
Manganese	180	220	176	85.5	68.2	136	10.4	11.4	12.8	11.2	9.6	34.3	8.2
Mercury	2.3	0.10	--	0.028 J	0.023 B	0.041 U	0.046 B	0.026 B	0.039 U	0.027 B	0.04 U	0.037 U	0.022 B
Nickel	150	38.0	17.6	7.6	1.7	5.2	2	2.2	2.5	2.7	2.7	3.1	2.2
Potassium	--	--	901	1,240 J	218 J	1,380	2,450	1,350	515 J	471 J	882	499 J	857
Silver	39	560	--	0.59 U	0.55 U	0.62 U	0.66 U	0.72 U	0.58 U	0.56 U	0.6 U	0.55 U	0.58 U
Sodium	--	--	811	203 J	106 J	2,070	119 J	120 J	106 J	105 J	123 J	105 J	110 J
Thallium	--	1.00	--	1.2 U	1.1 U	1.2 U	1.3 U	1.4 U	1.2 U	1.1 U	1.2 U	1.1 U	1.2 U
Vanadium	39	130	48.3	19	6.1	14	33.9	**65.5**	22.7	19.6	29.9	17.9	21.4
Zinc	2,300	120	28	34.6	8	18.2	12.3	13	8.4	8.5	9	6.8	6.6
Wet Chemistry													
pH (ph)	--	--	--	8.06	5.46	8.35	5.8	6.17	6.62	NA	7.18	5.76	6.12
Total organic carbon (TOC) (mg/kg)	--	--	--	9,577	5,792	7,436	3,355	3,227	1,783	NA	2,293	4,328	3,315
Grain Size (pct/p)													
Sieve No. 004 (4.75 mm)	--	--	--	99.5	98.5	75.9	98.9	97.6	100	NA	99.7	100	100
Sieve No. 010 (2.00 mm)	--	--	--	93.9	92.3	58.1	79.9	75.6	94.2	NA	88.9	93.8	95.4
Sieve No. 020 (850 um)	--	--	--	72.6	82.1	39.5	58.5	56.3	81	NA	74.4	81.4	84
Sieve No. 040 (425 um)	--	--	--	56.1	63.5	25.4	44.6	42.3	69.9	NA	61.5	68.7	76.6
Sieve No. 060 (250 um)	--	--	--	38.4	34.2	16.4	34.9	25.1	35.1	NA	34.6	41.7	56.7
Sieve No. 080 (180 um)	--	--	--	26.8	15.4	9.6	23.4	13.9	10.4	NA	14.8	18.6	22.7
Sieve No. 100 (150 um)	--	--	--	24.2	12.1	7.3	19.7	11.9	7.4	NA	10.9	13.5	17.6
Sieve No. 230 (63-UM)	--	--	--	9.8	1	0.3	2.7	2	0.9	NA	1.2	0.9	2.2
Sieve No. 200 (75 um)	--	--	--	10.4	1.2	0.5	4.5	2.6	1.3	NA	1.8	2.2	3.6

Notes:

Blue text indicates exceedance of ECO SVs at depths less than 2 feet* (samples collected at depth intervals larger than 2 feet were not compared to ECO criteria)

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text inidcated exceedance of both ECO SVs and Adjusted Residential Soil RSLs

*Samples shaded in yellow were collected at depths less than 2 feet

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-5

Subsurface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**ECO Screening Value**	**Yorktown 95 % UTL Background - Subsurface Soil**	YS24-SB18	YS24-SB19
Sample ID				YS24-SB18-7-8-0410	YS24-SB19-5-6-0410
Sample Date				04/20/10	04/20/10
Depth				7-8'	5-6'
Chemical Name					
Volatile Organic Compounds (µg/kg)					
1,2,4-Trichlorobenzene	6,200	1270	--	0.33 J	2.8 U
2-Butanone	2,800,000	--	--	8.1 U	7 U
Acetone	6,100,000	--	--	3.6 B	11 B
Carbon disulfide	82,000	--	--	3.2 U	2.8 U
Chloromethane	12,000	5,000	--	3.2 U	2.8 U
Ethylbenzene	5,400	1,815	--	3.2 U	2.8 U
Methyl acetate	7,800,000	--	--	3.2 U	2.9 K
Methylene chloride	11,000	1,250	--	0.4 B	0.6 B
Semivolatile Organic Compounds (µg/kg)					
2,4-Dinitrotoluene	1,600	11,000	--	1,500 U	1,500 U
2,6-Dinitrotoluene	6,100	8,500	--	3,000 U	3,000 U
Benzo(a)anthracene	150	--	--	200 U	200 U
Benzo(a)pyrene	15	--	--	200 U	200 U
Benzo(b)fluoranthene	150	--	--	200 U	200 U
Benzo(g,h,i)perylene	170,000	--	--	200 U	200 U
Benzo(k)fluoranthene	1,500	--	--	200 U	200 U
bis(2-Ethylhexyl)phthalate	35,000	30,000	--	200 U	200 U
Butylbenzylphthalate	260,000	30,000	--	200 U	200 U
Chrysene	15,000	--	--	200 U	200 U
Dibenz(a,h)anthracene	15	--	--	200 U	200 U
Di-n-butylphthalate	610,000	40,000	--	200 U	200 U
Fluoranthene	230,000	--	--	200 U	200 U
Indeno(1,2,3-cd)pyrene	150	--	--	200 U	200 U
Phenanthrene	1,700,000	--	--	200 U	200 U
Pyrene	170,000	--	--	200 U	200 U
Pesticide/Polychlorinated Biphenyls (µg/kg)					
4,4'-DDD	2,000	583	--	3.9 U	0.42 L
4,4'-DDE	1,400	114	--	3.9 U	3.9 UL
4,4'-DDT	1,700	100	--	3.9 U	2.2 L
alpha-BHC	77	226	--	2 U	2 UL
alpha-Chlordane	1,600	11.0	--	2 U	2 UL
beta-BHC	270	342	--	2 U	2 UL
delta-BHC	270	226	--	2 U	2 UL
Dieldrin	30	10.5	--	3.9 U	3.9 UL
Endosulfan I	37,000	6.32	--	2 U	2 UL
Endrin	1,800	1.95	--	3.9 U	3.9 UL
Endrin aldehyde	1,800	1.95	--	3.9 UL	3.9 UL
gamma-Chlordane	1,600	11.0	--	2 U	2 UL
Explosives (µg/kg)					
1,3,5-Trinitrobenzene	220,000	--	--	1,500 UL	1,500 UL
2,4,6-Trinitrotoluene	3,600	10,000	--	1,500 U	1,500 U
4-Amino-2,6-dinitrotoluene	15,000	80,000	--	1,500 U	1,500 U
Total Metals (mg/kg)					
Aluminum	7,700	pH < 5.5	13,000	7,240	**7,920**
Antimony	3.1	78.0	--	1.2 U	0.4 J
Arsenic	0.39	18.0	5.54	**6.8**	1.2 U
Barium	1,500	330	84.5	15.3 J	12.6 J
Beryllium	16	40.0	--	0.14 B	0.14 B
Cadmium	7	32.0	--	0.09 B	0.59 U
Calcium	--	--	2,380	877	887
Chromium	0.29	64.0	33.7	**17.5**	**12.3**
Cobalt	2.3	13.0	5.18	0.54 J	0.67

TABLE 4-5

Subsurface Soil Data Exceedance Results

Outside the Estimated Buried Debris Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**Adjusted Residential Soil RSLs**	**ECO Screening Value**	**Yorktown 95 % UTL Background - Subsurface Soil**	YS24-SB18	YS24-SB19
Sample ID				YS24-SB18-7-8-0410	YS24-SB19-5-6-0410
Sample Date				04/20/10	04/20/10
Depth				7-8'	5-6'
Chemical Name					
Copper	310	70.0	3.17	2.1	1.8
Total Metals cont. (mg/kg)					
Cyanide	160	15.8	--	0.59 U	0.56 U
Iron	5,500	5 < pH > 8	32,000	**9,670**	**6,270**
Lead	400	120	8.79	7	7.4
Magnesium	--	--	1,120	619	484 J
Manganese	180	220	176	7.6	8.6
Mercury	2.3	0.10	--	0.019 B	0.039 U
Nickel	150	38.0	17.6	1.4	1.6
Potassium	--	--	901	1,170	602
Silver	39	560	--	0.59 U	0.59 U
Sodium	--	--	811	130 J	110 J
Thallium	--	1.00	--	1.2 U	1.2 U
Vanadium	39	130	48.3	24.9	17.6
Zinc	2,300	120	28	5.8	7.4
Wet Chemistry					
pH (ph)	--	--	--	6.15	6.11
Total organic carbon (TOC) (mg/kg)	--	--	--	4,458	2,505
Grain Size (pct/p)					
Sieve No. 004 (4.75 mm)	--	--	--	99.8	100
Sieve No. 010 (2.00 mm)	--	--	--	91.7	96.2
Sieve No. 020 (850 um)	--	--	--	77.6	83.5
Sieve No. 040 (425 um)	--	--	--	63.4	65.3
Sieve No. 060 (250 um)	--	--	--	28	35.1
Sieve No. 080 (180 um)	--	--	--	11	14.6
Sieve No. 100 (150 um)	--	--	--	8.3	11.2
Sieve No. 230 (63-UM)	--	--	--	0.8	0.8
Sieve No. 200 (75 um)	--	--	--	1.1	1.3

Notes:

Blue text indicates exceedance of ECO SVs at depths less than 2 feet* (samples collected at depth intervals larger than 2 feet were not compared to ECO criteria)

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text inidcated exceedance of both ECO SVs and Adjusted Residential Soil RSLs

*Samples shaded in yellow were collected at depths less than 2 feet

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-6

Drainage Soil Data Exceedance Results

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95 % UTL Background - Surface Soil	Yorktown Maximum Background - Surface Soil	24SS02	24SS03		24SS04	YS24-SS22	YS24-SS23	YS24-SS24	YS24-SS25	YS24-SS26		YS24-SS27	YS24-SS28	YS24-SS29	YS24-SS30	YS24-SS31
Sample ID					24SS02	24SS03	24SS03D	24SS04	YS24-SS22-0410	YS24-SS23-0410	YS24-SS24-0410	YS24-SS25-0410	YS24-SS26-0410	YS24-SS26P-0410	YS24-SS27-0410	YS24-SS28-0410	YS24-SS29-0410	YS24-SS30-0410	YS24-SS31-0410
Sample Date					09/09/97	09/09/97	09/09/97	09/09/97	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10
Depth					0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'
Chemical Name																			
Volatile Organic Compounds (µg/kg)																			
2-Butanone	2,800,000	--	--	--	10 U	11 U	11 U	11 U	3.7 U	16 K	2.5 B	4.4 B	8.9 J	7.2 J	3.2 B	4.6 B	9.6 B	8.8 K	8.1 K
Methyl acetate	7,800,000	--	--	--	NA	NA	NA	NA	4.8 J	2.5 U	17 J	10 J	220 J	24 J	42 J	37 J	560 J	25 K	120 J
Styrene	630,000	64,000	--	--	10 U	11 U	11 U	11 U	0.04 J	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Toluene	500,000	40,000	--	--	10 U	0.8 J	11 U	6 J	0.18 B	0.39 B	0.26 B	0.34 B	0.53 B	0.5 B	0.22 B	0.38 B	0.44 B	2.5 U	0.22 B
Xylene, total	63,000	1,300	--	--	10 U	1 J	2 B	2 B	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Semivolatile Organic Compounds (µg/kg)																			
Acenaphthylene	340,000	--	--	110	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	26 J
Anthracene	1,700,000	--	--	--	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	35 J
Benzo(a)anthracene	150	--	--	220	340 U	360 U	360 U	370 U	200 U	220 U	190 U	44 J	190 U	32 J	180 U	190 U	200 U	190 U	**160 J**
Benzo(a)pyrene	15	--	--	340	340 U	360 U	360 U	370 U	200 U	220 U	190 U	**52 J**	**20 J**	**28 J**	180 U	190 U	200 U	190 U	**180 J**
Benzo(b)fluoranthene	150	--	--	650	340 U	360 U	360 U	370 U	200 U	220 U	190 U	91 J	21 J	33 J	180 U	190 U	200 U	190 U	**250**
Benzo(g,h,i)perylene	170,000	--	--	350	340 U	360 U	360 U	370 U	200 U	220 U	190 U	22 J	190 U	190 U	180 U	190 U	200 U	190 U	130 J
Benzo(k)fluoranthene	1,500	--	--	260	340 U	360 U	360 U	370 U	200 U	220 U	190 U	92 J	29 J	33 J	180 U	190 U	200 U	190 U	300
bis(2-Ethylhexyl)phthalate	35,000	30,000	--	--	340 U	360 U	360 U	370 U	140 J	220 U	50 J	180 U	190 U	43 J	41 J	110 J	320	190 U	140 J
Chrysene	15,000	--	--	480	340 U	360 U	360 U	370 U	200 U	220 U	190 U	81 J	30 J	39 J	180 U	190 U	200 U	190 U	260
Dibenz(a,h)anthracene	15	--	--	--	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	**45 J**
Fluoranthene	230,000	--	--	270	340 U	360 U	360 U	370 U	200 U	57 J	38 J	94 J	59 J	65 J	180 U	190 U	200 U	190 U	250
Indeno(1,2,3-cd)pyrene	150	--	--	340	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	150 J
Phenanthrene	1,700,000	--	--	--	340 U	360 U	360 U	370 U	28 J	61 J	42 J	40 J	63 J	49 J	26 J	190 U	200 U	190 U	44 J
Pyrene	170,000	--	--	330	340 U	360 U	360 U	370 U	200 U	47 J	31 J	96 J	53 J	62 J	180 U	190 U	200 U	190 U	330
Pesticide/Polychlorinated Biphenyls (µg/kg)																			
4,4'-DDD	2,000	583	--	12	3.4 U	3.6 U	3.6 U	3.8 U	1.4 J	4.3 UJ	3.7 UJ	3.5 UJ	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
4,4'-DDE	1,400	114	--	23	3.4 U	0.26 J	0.26 J	3.8 U	0.53 J	4.3 UJ	3.7 UJ	0.72 J	0.39 J	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	0.66 J	0.59 J
4,4'-DDT	1,700	100	--	10	0.75 B	1.1 B	0.88 B	0.75 B	3.8 UJ	4.3 UJ	3.7 UJ	3.5 UJ	3.7 UJ	0.62 J	3.5 UJ	3.8 UJ	3.8 UJ	2.1 J	0.64 J
Aldrin	29	3.63	--	--	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	0.26 J	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	1.9 UJ
alpha-BHC	77	226	--	1.6	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	1.8 UJ	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	0.5 J
alpha-Chlordane	1,600	11.0	--	4.7	1.7 U	0.42 J	0.3 J	1.9 U	0.99 J	2.2 UJ	1.9 UJ	0.31 J	1 J	0.64 J	1.8 UJ	0.29 J	0.26 J	1.9 UJ	1.9 UJ
beta-BHC	270	342	--	14	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	1.8 UJ	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	0.79 J
delta-BHC	270	226	--	5	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	0.97 J	0.2 J	0.18 J	0.19 J	0.27 J	2 UJ	1.9 UJ	1.9 UJ
Dieldrin	30	10.5	--	4.4	3.4 U	0.26 J	0.24 J	0.23 J	3.8 UJ	4.3 UJ	3.7 UJ	3.5 UJ	0.44 J	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
Endosulfan I	37,000	6.32	--	2.1	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	0.61 J	1.9 UJ	1.9 UJ	1.8 UJ	0.26 J	2 UJ	1.9 UJ	0.33 J
Endosulfan II	37,000	6.32	--	2.1	3.4 U	3.6 U	3.6 U	3.8 U	3.8 UJ	4.3 UJ	3.7 UJ	3.5 UJ	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	0.42 J
Endrin	1,800	1.95	--	3.5	3.4 U	3.6 U	3.6 U	3.8 U	3.8 UJ	4.3 UJ	3.7 UJ	0.56 J	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
Endrin aldehyde	1,800	1.95	--	12	3.4 U	3.6 U	3.6 U	3.8 U	0.52 J	4.3 UJ	3.7 UJ	0.52 J	0.38 J	0.48 J	3.5 UJ	3.8 UJ	0.41 J	3.7 UJ	1.2 J
Endrin ketone	1,800	1.95	--	4.5	3.4 U	3.6 U	3.6 U	3.8 U	3.8 UJ	4.3 UJ	3.7 UJ	0.61 J	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
gamma-BHC (Lindane)	520	7.75	--	3.3	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	1.8 UJ	0.3 J	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	0.37 J	0.81 J
gamma-Chlordane	1,600	11.0	--	7	1.7 U	0.36 J	0.27 J	1.9 U	1.1 J	2.2 UJ	1.9 UJ	0.25 J	0.6 J	0.76 J	1.8 UJ	0.28 J	2 UJ	0.3 J	1.3 J
Heptachlor	110	52.9	--	--	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	0.2 J	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	0.26 J
Explosives (µg/kg)																			
No Detections																			
Total Metals (mg/kg)																			
Aluminum	7,700	pH < 5.5	12,200	19,200	**3,130 J**	6,200 J	6,770 J	**8,870 J**	**9,340**	6,470	5,530	**4,640**	4,820	4,860	**4,440**	**11,900**	**10,100**	5,430	5,390
Antimony	3.1	78.0	--	11	0.79 UL	0.82 UL	0.83 UL	0.85 UL	0.49 J	1.3 U	1.1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.69 J
Arsenic	0.39	18.0	6.36	63.9	**1.8 J**	**2.9**	**2.6**	**9.1**	**3.4**	**2.8**	1.2 B	1 U	1.1 U	1.1 U	0.32 B	0.74 B	**2.1**	0.46 B	**151**
Barium	1,500	330	52.9	80.2	13.6 J	34.8 J	36 J	27 J	30	23.6 J	15.3 J	20.2 J	30.9	30.1	20.2 J	34.5	47.3	31.3	34.4
Beryllium	16	40.0	0.587	1.1	0.04 U	0.11 J	0.11 J	0.16 J	0.26 J	0.35 J	0.17 B	0.14 B	0.23 J	0.21 B	0.21 B	0.29 J	0.27 J	0.27 J	0.49 J
Cadmium	7	32.0	--	1.5	0.06 B	0.33 J	0.37 J	0.15 B	0.59	0.61 J	0.22 J	0.1 J	0.71	0.76	0.58	0.42 J	0.39 J	0.31 J	0.19 J
Calcium	--	--	2,290	33,500	357 J	1,600 J	1,150 J	1,070 J	877	75,500	493 J	284 J	549	621	122 J	706	924	1,090	432 J
Chromium	0.29	64.0	18.2	43.2	**7.3 J**	**10.9 J**	**10.9 J**	**24.6 J**	**17.2**	**12.7**	**8**	**4.7**	**4.8**	**5**	**5**	**12.5**	**10.5**	**5.8**	**5.3**
Cobalt	2.3	13.0	9.93	6.7	0.62 J	1.7 J	1.8 J	1.6 J	1.1	1.7	0.51 J	0.38 J	1.4	1.4	0.88	2.1	**5.1**	1.8	**9**
Copper	310	70.0	4.25	24.4	2.7 J	4.5 J	4.6 J	5.7	5.6	4.3	1.5	1.2	3.5	4.7	3.3	2.3	1.5	3.6	2.7
Cyanide	160	15.8	--	--	2.1 UL	0.18 L	0.17 L	2.2 UL	0.58 U	0.64 U	0.55 U	0.52 U	0.54 U	0.53 U	0.2 J	0.57 U	0.56 U	0.54 U	0.56 U
Iron	5,500	5 < pH > 8	19,900	20,700	4,760	**6,050**	**5,840**	**15,100**	**9,330**	**8,140**	4,420	2,700	2,790	2,850	2,810	**6,610**	**5,990**	4,230	3,040

TABLE 4-6

Drainage Soil Data Exceedance Results

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95 % UTL Background - Surface Soil	Yorktown Maximum Background - Surface Soil	24SS02	24SS03		24SS04	YS24-SS22	YS24-SS23	YS24-SS24	YS24-SS25	YS24-SS26		YS24-SS27	YS24-SS28	YS24-SS29	YS24-SS30	YS24-SS31
Sample ID					24SS02	24SS03	24SS03D	24SS04	YS24-SS22-0410	YS24-SS23-0410	YS24-SS24-0410	YS24-SS25-0410	YS24-SS26-0410	YS24-SS26P-0410	YS24-SS27-0410	YS24-SS28-0410	YS24-SS29-0410	YS24-SS30-0410	YS24-SS31-0410
Sample Date					09/09/97	09/09/97	09/09/97	09/09/97	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10
Depth					0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'
Chemical Name																			
Lead	400	120	17.4	136	5.5 L	11	11.6	9.2	8.6	10.6	5.2	5	9	9.4	7	7.4	7	11.2	6.2
Total Metals cont. (mg/kg)																			
Magnesium	--	--	1,070	6,770	222 J	503 J	568 J	1,010 J	725	1,340	413 J	301 J	332 J	335 J	226 J	603	563 J	342 J	387 J
Manganese	180	220	324	491	27.6 K	98.7	103	25.7 K	23	93.5	16.9	12.5	67.5	66.4	32.9	15.1	55	77	113
Mercury	2.3	0.10	0.111	0.24	0.05 U	0.1 J	0.1 J	0.07 J	0.54	0.031 J	0.038	0.018 J	0.029 J	0.026 J	0.021 J	0.037 U	0.038 U	0.04	0.018 J
Nickel	150	38.0	9.52	14.2	1.7 J	3.7 J	3.6 J	3.3 J	2.5	3.8	1.3	1.2	2.5	2.6	2	4.3	5.8	3.3	6.5
Potassium	--	--	708	4,560	220 J	431 J	498 J	868 J	834	1,240	598	231 J	285 J	282 J	221 J	483 J	480 J	331 J	302 J
Silver	39	560	--	2.1	0.21 U	0.22 U	0.22 U	0.22 U	0.35 J	0.64 U	0.55 U	0.52 U	0.54 U	0.53 U	0.54 U	0.57 U	0.57 U	0.54 U	0.55 U
Sodium	--	--	521	21,300	45.9 U	48.1 U	48.2 U	49.9 U	90.9 J	315 J	91.5 J	85.7 J	85.6 J	92.6 J	73 J	87.7 J	91.7 J	78 J	79.8 J
Vanadium	39	130	27.9	50.3	12.6	21.8	22.8	28.9	20.8	15.7	11.1	7.8	7.7	7.8	6.5	18.5	16.8	10.1	6.8
Zinc	2,300	120	26.5	113	14.1 K	39.4 K	41.4	21 K	13.8	16.9	6.2	5.9	21.9	24.2	17.8	15.4	25.5	14.5	15.7
Wet Chemistry																			
Cation Exchange Capacity (MEQ/100G) (	--	--	--		4,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	--	--	--		5.3	NA	NA	NA	5.55	8.2	6.13	5.08	6.55	NA	5.44	5.76	7.19	7.72	5.97
Total organic carbon (TOC) (mg/kg)	--	--	--		4,700	NA	NA	NA	3,909	20,740	4,796	6,708	16,160	NA	8,456	14,200	5,448	12,920	9,767
Geotechnical (g/cc)																			
Density	--	--	--		1.48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size (pct/p)																			
Sieve No. 004 (4.75 mm)	--	--	--		NA	NA	NA	NA	99.8	80.6	99	99	95.8	NA	99.3	100	100	98	99.1
Sieve No. 010 (2.00 mm)	--	--	--		NA	NA	NA	NA	89.6	63.3	90.1	92.9	87.3	NA	96.9	95.2	99.4	94.8	97.3
Sieve No. 020 (850 um)	--	--	--		NA	NA	NA	NA	72.5	45.4	80.4	83.2	78	NA	81.6	80.1	80.7	85.5	91.3
Sieve No. 040 (425 um)	--	--	--		NA	NA	NA	NA	56.4	29.8	70.9	66.5	60.8	NA	59.5	64.3	64.8	71.2	78.9
Sieve No. 060 (250 um)	--	--	--		NA	NA	NA	NA	32.3	16.5	43	39.1	29.1	NA	32.5	34.7	37.9	41.6	40.7
Sieve No. 080 (180 um)	--	--	--		NA	NA	NA	NA	15	9	13.8	18.5	15.4	NA	15.2	13.1	17	18.3	16.8
Sieve No. 100 (150 um)	--	--	--		NA	NA	NA	NA	12	7.4	9.4	13.9	12.5	NA	11.4	10.3	13.3	14.5	13.2
Sieve No. 230 (63-UM)	--	--	--		NA	NA	NA	NA	1.5	1	1.8	2.3	1.9	NA	1.3	1.8	2	3.7	2.2
Sieve No. 200 (75 um)	--	--	--		NA	NA	NA	NA	2.3	1.5	2.3	3.3	2.5	NA	1.9	2.4	3.1	4.6	3.2

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text inidcated exceedance of both ECO SVs and Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

B - Analyte not detected above the level reported in associated 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

NA - Not analyzed

ND - Not Detected

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

g/cc - Grams per cubic centimeter

mg/kg - Milligrams per kilogram

ph - pH units

µg/kg - Micrograms per kilogram

TABLE 4-7

Analytical Results for Detected Constituents, with Exceedances

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	MCL	Tapwater RSLs Adjusted, May 2013	ESV	BTAG Value	Background for Cornwallis Cave Aquifer*	YS24-GW/SB09	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08
Sample ID						YS24-GW09S-0610	YS24-GW04S-0610	YS24-GW05S-0610	YS24-GW06S-0610	YS24-GW07S-0610	YS24-GW08S-0610
Sample Date						06/15/10	06/16/10	06/16/10	06/16/10	06/16/10	06/15/10
Chemical Name											
Volatile Organic Compounds (µg/l)											
Carbon disulfide	--	72	0.92	0.92	--	0.12 B	0.2 J	0.5 U	0.5 U	0.031 J	0.097 B
Chloroform	80	0.19	815	815	--	0.5 U	0.5 U	0.5 U	0.087 J	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	--	110	--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatile Organic Compounds (µg/l)											
2,6-Dinitrotoluene	--	0.042	1,000	81	--	5 U	5 U	5 U	5 U	5 U	5 U
Benzo(b)fluoranthene	--	0.029	9.07	--	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(g,h,i)perylene	--	8.7	7.64	--	--	5 U	5 U	5 U	5 U	5 U	5 U
Benzo(k)fluoranthene	--	0.29	9.07	--	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chrysene	--	2.9	--	--	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Fluoranthene	--	63	11	1.6	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Indeno(1,2,3-cd)pyrene	--	0.029	4.31	--	--	5 U	5 U	5 U	5 U	5 U	5 U
Nitrobenzene	--	0.12	66.8	66.8	--	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Phenanthrene	--	130	8.3	1.5	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Pyrene	--	8.7	0.24	0.24	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Pesticide/Polychlorinated Biphenyls (µg/l)											
alpha-BHC	--	0.0062	25	25	--	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	--	0.022	25	--	--	0.05 U	0.028 B	0.05 U	0.05 U	0.026 B	0.05 U
Dieldrin	--	0.0015	0.11	0.11	--	0.1 U	0.1 U	0.1 U	**0.0038 J**	0.1 U	0.1 U
Endosulfan I	--	7.8	0.0087	0.051	--	0.05 U	0.05 U	0.05 U	0.026 J	0.05 U	0.05 U
Endosulfan II	--	7.8	0.0087	0.051	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Endrin	2	0.17	0.01	0.01	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
gamma-BHC (Lindane)	0.2	0.036	0.016	0.016	--	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-Chlordane	--	0.19	0.004	0.0022	--	0.05 U	0.05 U	0.05 U	*0.0061 J*	0.05 U	0.05 U
Heptachlor	0.4	0.0018	0.0036	0.0019	--	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.2	0.0033	0.0036	0.0019	--	0.05 U	***0.028 J***	0.05 U	0.05 U	0.05 U	***0.006 J***
Methoxychlor	40	2.7	0.03	0.03	--	0.5 U	0.5 U	0.5 U	*0.036 J*	0.5 U	0.5 U
Explosives (µg/l)											
1,3,5-Trinitrobenzene	--	46	15	--	--	2.5 U	2.5 U	2.5 U	1.18 J	2.5 U	2.5 U
1,3-Dinitrobenzene	--	0.15	180	--	--	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2,4,6-Trinitrotoluene	--	0.76	100	100	--	2.5 U	2.5 U	**1.32 J**	**1.66 J**	2.5 U	2.5 U
2-Amino-4,6-dinitrotoluene	--	3	19	1,480	--	5 U	5 U	5 U	5 U	5 U	5 U
4-Amino-2,6-dinitrotoluene	--	3	19	--	--	5 U	5 U	5 U	0.782 J	5 U	5 U
RDX	--	0.61	5,000	360	--	4 U	4 U	**1.78 J**	4 U	4 U	4 U
Total Metals (µg/l)											
Aluminum	--	1,600	87	87	2,230	70.1 B	52.4 B	64.1 B	37.9 B	62 B	69.7 B
Barium	2,000	290	200	4	118	200 U	*18.2 J*	*19.2 J*	*20.1 J*	200 U	*20.9 J*
Calcium	--	--	--	--	158,000	101,000	123,000	108,000	105,000	107,000	108,000
Cyanide	200	0.14	1	1	--	10 U	10 U	***5.4 J***	10 U	10 U	10 U
Iron	--	1,100	1,000	300	3,590	16.8 J	100 U	100 U	100 U	100 U	178
Magnesium	--	--	--	--	3,600	1,940 J	2,770 J	4,000 J	2,470 J	2,510 J	1,500 J
Manganese	--	32	100	120	57.9	4.9 J	7 B	1.6 B	13.6 B	3.3 B	15.4
Potassium	--	--	--	--	3,490	286 J	492 J	1,750 J	5,000 U	1,520 J	5,000 U
Selenium	50	7.8	71.1	--	--	5 U	2.9 B	2.4 B	5 U	5 U	5 U
Sodium	--	--	--	--	9,920	3,650 J	5,010	8,250	4,360 B	4,570 B	3,730 J
Zinc	--	470	85.6	--	4.52	20 U	20 U	20 U	20 U	20 U	20 U

TABLE 4-7

Analytical Results for Detected Constituents, with Exceedances

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**MCL**	**Tapwater RSLs Adjusted, May 2013**	**ESV**	**BTAG Value**	**Background for Cornwallis Cave Aquifer***	YS24-GW/SB09	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08
Sample ID						YS24-GW09S-0610	YS24-GW04S-0610	YS24-GW05S-0610	YS24-GW06S-0610	YS24-GW07S-0610	YS24-GW08S-0610
Sample Date						06/15/10	06/16/10	06/16/10	06/16/10	06/16/10	06/15/10
Chemical Name											
Dissolved Metals (µg/l)											
Aluminum, Dissolved	--	1,600	87	--	100	59.1 B	60.9 B	89.4 B	64.6 B	70 B	42.8 B
Barium, Dissolved	2,000	290	200	--	127	200 U	19.4 J	20.1 J	21.8 J	200 U	20.4 J
Beryllium, Dissolved	4	1.6	100	--	--	5 U	0.91 J	1.5 J	0.9 J	0.88 J	5 U
Calcium, Dissolved	--	--	--	--	148,000	98,600	117,000	106,000	106,000	108,000	114,000
Chromium, Dissolved	100	0.031	50	--	6.04	1.5 B	10 U	10 U	10 U	1 B	10 U
Copper, Dissolved	1,300	62	3.1	3.1	3	5 U	5 U	5 U	5 U	5 U	5 U
Iron, Dissolved	--	1,100	1,000	--	631	100 U	100 U	100 U	100 U	100 U	116
Magnesium, Dissolved	--	--	--	--	3,880	2,030 J	2,870 J	4,210 J	2,660 J	2,690 J	1,620 J
Manganese, Dissolved	--	32	100	--	49.5	5.5 J	7.7 J	1.4 B	16	3.3 B	13.4
Potassium, Dissolved	--	--	--	--	1,710	391 B	685 B	1,970 B	128 B	1,630 B	5,000 U
Selenium, Dissolved	50	7.8	71	71	9.1	5 U	5 U	5 U	5 U	5 U	5 U
Sodium, Dissolved	--	--	--	--	10,000	3,960 J	5,410	8,920	5,560	4,760 J	4,190 J
Vanadium, Dissolved	--	6.3	50	--	4.3	20 U	20 U	20 U	20 U	20 U	1.7 J
Zinc, Dissolved	--	470	81	81	--	8.6 B	18 B	5.6 B	11.7 B	5 B	20 U
Wet Chemistry (µg/l)											
Methane	--	--	--	--	--	NA	NA	NA	0.1 J	NA	0.2 J
Wet Chemistry (mg/l or pH)											
Alkalinity	--	--	--	--	--	NA	NA	NA	189	NA	208
Chloride	--	--	--	--	--	NA	NA	NA	6.94	NA	4.3
Nitrate	10	--	--	--	--	NA	NA	NA	0.254 J	NA	0.587
pH	--	--	--	--	--	NA	NA	NA	7.84	NA	8.04
Sulfate	--	--	--	--	--	NA	NA	NA	13.8	NA	14.4
Total organic carbon (TOC)	--	--	--	--	--	NA	NA	NA	1.1	NA	1.1

Notes:

Underline indicates exceedance of the MCL

Bold text indicates exceedance of Tapwater RSLs Adjusted, May 2013

Shading indicates exceedance of the ESV

Italicized text indicates exceedance of the BTAG Value

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* Background values are included for reference only, data has not been screened against background. Background values are equal to the 95% UTL if one exists. If no 95% UTL exists, the max background value is shown; this is the case for the following dissolved metals: aluminum, copper, selenium, and vanadium.

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3 - Laboratory Qualifier. Sample was received outside of EPA recommended holdtime of "ASAP"

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

M - Laboratory Qualifier. Matrix interference was observed and the reporting limit adjusted accordingly

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

mg/l - Milligrams per liter

ph - pH units

µg/l - Micrograms per liter

TABLE 4-7

Analytical Results for Detected Constituents, with Exceedances

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**MCL**	**Tapwater RSLs Adjusted, May 2013**	**ESV**	**BTAG Value**	YS24-GW03		YS24-GW10	YS24-GW11	
Sample ID					YS24-GW03S-0610	YS24-GW03SP-0610	YS24-GW10S-0610	YS24-GW11-0713	YS24-GW11P-0713
Sample Date					06/16/10	06/16/10	06/16/10	07/08/13	07/08/13
Chemical Name									
Volatile Organic Compounds (µg/l)									
Carbon disulfide	--	72	0.92	0.92	0.5 U	0.5 U	0.045 J	0.5 U	0.5 U
Chloroform	80	0.19	815	815	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	--	110	--	--	1	1	0.5 U	1 U	1 U
Semivolatile Organic Compounds (µg/l)									
2,6-Dinitrotoluene	--	0.042	1,000	81	5 U	5 U	5 U	**0.653 J**	**0.193 J**
Benzo(b)fluoranthene	--	0.029	9.07	--	0.2 U	0.2 U	0.2 U	0.0962 U	**0.0637 J**
Benzo(g,h,i)perylene	--	8.7	7.64	--	5 U	5 U	5 U	0.0962 U	0.0602 J
Benzo(k)fluoranthene	--	0.29	9.07	--	0.2 U	0.2 U	0.2 U	0.0962 U	0.0521 J
Chrysene	--	2.9	--	--	0.2 U	0.2 U	0.2 U	0.0962 U	0.0629 J
Fluoranthene	--	63	11	1.6	0.2 U	0.2 U	0.2 U	0.0962 U	0.0838 J
Indeno(1,2,3-cd)pyrene	--	0.029	4.31	--	5 U	5 U	5 U	0.0962 U	**0.0608 J**
Nitrobenzene	--	0.12	66.8	66.8	2.5 U	2.5 U	2.5 U	**0.902 J**	**0.955**
Phenanthrene	--	130	8.3	1.5	0.2 U	0.2 U	0.2 U	0.192 U	0.0995 J
Pyrene	--	8.7	0.24	0.24	0.2 U	0.2 U	0.2 U	0.0962 U	0.0767 J
Pesticide/Polychlorinated Biphenyls (µg/l)									
alpha-BHC	--	0.0062	25	25	0.05 U	0.05 U	0.05 U	0.00943 U	0.00492 J
beta-BHC	--	0.022	25	--	0.043 B	0.032 B	0.02 B	**0.0451 J**	**0.0438 J**
Dieldrin	--	0.0015	0.11	0.11	0.1 U	0.1 U	**0.0041 J**	0.00943 U	0.00943 U
Endosulfan I	--	7.8	0.0087	0.051	0.05 U	0.05 U	0.0056 J	0.00505 J	0.00943 U
Endosulfan II	--	7.8	0.0087	0.051	0.1 U	0.1 U	0.0046 J	0.00943 U	0.00943 U
Endrin	2	0.17	0.01	0.01	0.0057 J	0.1 U	0.0066 J	0.00943 U	0.00943 U
gamma-BHC (Lindane)	0.2	0.036	0.016	0.016	0.05 U	0.05 U	0.05 U	*0.0284 J*	*0.0233 J*
gamma-Chlordane	--	0.19	0.004	0.0022	0.05 U	0.05 U	0.05 U	0.00943 U	0.00943 U
Heptachlor	0.4	0.0018	0.0036	0.0019	0.05 U	0.05 U	0.05 U	***0.019 J***	***0.0167 J***
Heptachlor epoxide	0.2	0.0033	0.0036	0.0019	0.05 U	0.05 U	***0.0067 J***	0.00943 U	0.00943 U
Methoxychlor	40	2.7	0.03	0.03	0.5 U	0.5 U	0.5 U	0.00943 U	0.00943 U
Explosives (µg/l)									
1,3,5-Trinitrobenzene	--	46	15	--	2.5 U	2.5 U	2.5 U	1.46	1.47
1,3-Dinitrobenzene	--	0.15	180	--	2.5 U	2.5 U	2.5 U	0.0962 J	0.0939 J
2,4,6-Trinitrotoluene	--	0.76	100	100	2.5 U	2.5 U	2.5 U	**2.23**	**2.25**
2-Amino-4,6-dinitrotoluene	--	3	19	1,480	5 U	5 U	5 U	1.9	1.89
4-Amino-2,6-dinitrotoluene	--	3	19	--	5 U	5 U	5 U	2.36	2.32
RDX	--	0.61	5,000	360	4 U	4 U	4 U	0.151 U	0.151 U
Total Metals (µg/l)									
Aluminum	--	1,600	87	87	47.7 B	43.5 B	77.8 B	18.2 J	25 UJ
Barium	2,000	290	200	4	*15.5 J*	*15.6 J*	*17.1 J*	*14.6*	*16.4*
Calcium	--	--	--	--	126,000	125,000	85,000	106,000	106,000
Cyanide	200	0.14	1	1	10 U	***4.5 J***	10 U	10 U	***7.28 J***
Iron	--	1,100	1,000	300	100 U	100 U	50.3 B	22.1 J	17.7 J
Magnesium	--	--	--	--	2,680 J	2,670 J	1,950 J	2,170	2,070 J
Manganese	--	32	100	120	1.3 B	1.4 B	27.8	12.3	12.2 J
Potassium	--	--	--	--	1,030 J	1,080 J	618 J	1,700	1,660 J
Selenium	50	7.8	71.1	--	5 U	2.5 B	5 U	0.919 J	1.25 U
Sodium	--	--	--	--	5,360	5,390	3,580 B	3,630	3,760
Zinc	--	470	85.6	--	20 U	20 U	20 U	21.1	2.5 U

TABLE 4-7

Analytical Results for Detected Constituents, with Exceedances

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	**MCL**	**Tapwater RSLs Adjusted, May 2013**	**ESV**	**BTAG Value**	YS24-GW03		YS24-GW10	YS24-GW11	
Sample ID					YS24-GW03S-0610	YS24-GW03SP-0610	YS24-GW10S-0610	YS24-GW11-0713	YS24-GW11P-0713
Sample Date					06/16/10	06/16/10	06/16/10	07/08/13	07/08/13
Chemical Name									
Dissolved Metals (µg/l)									
Aluminum, Dissolved	--	1,600	87	--	52.7 B	70.6 B	56.7 B	16.1 J	25 UJ
Barium, Dissolved	2,000	290	200	--	16.2 J	16.1 J	17.3 J	14.5	15.8
Beryllium, Dissolved	4	1.6	100	--	0.75 J	1.2 J	5 U	0.5 U	0.5 U
Calcium, Dissolved	--	--	--	--	123,000	119,000	85,600	105,000	101,000
Chromium, Dissolved	100	0.031	50	--	10 U	10 U	10 U	**0.953 J**	1 UJ
Copper, Dissolved	1,300	62	3.1	3.1	5 U	*4.2 J*	3.1 J	2 U	2 U
Iron, Dissolved	--	1,100	1,000	--	100 U	100 U	22.5 B	15 U	15 U
Magnesium, Dissolved	--	--	--	--	2,780 J	2,770 J	2,060 J	2,190	1,960 J
Manganese, Dissolved	--	32	100	--	1.5 B	1.3 B	28.3	12.2	11.4 J
Potassium, Dissolved	--	--	--	--	1,160 B	1,230 B	637 B	1,680	1,580 J
Selenium, Dissolved	50	7.8	71	71	5 U	5 U	5 U	0.852 J	1.25 U
Sodium, Dissolved	--	--	--	--	5,910	5,850	4,100 J	3,590	3,620
Vanadium, Dissolved	--	6.3	50	--	20 U	20 U	20 U	2.5 U	2.5 U
Zinc, Dissolved	--	470	81	81	20 U	20 U	5 B	2.47 J	1.89 J
Wet Chemistry (µg/l)									
Methane	--	--	--	--	NA	NA	0.1 J	2 U	NA
Wet Chemistry (mg/l or pH)									
Alkalinity	--	--	--	--	NA	NA	177	275	NA
Chloride	--	--	--	--	NA	NA	5.45	4.17 M	NA
Nitrate	10	--	--	--	NA	NA	0.349 J	0.268	NA
pH	--	--	--	--	NA	NA	7.75	7.44 H3	NA
Sulfate	--	--	--	--	NA	NA	19.8	12.8	NA
Total organic carbon (TOC)	--	--	--	--	NA	NA	0.75 J	2.5 U	NA

Notes:

Underline indicates exceedance of the MCL

Bold text indicates exceedance of Tapwater RSLs Adjusted, May 2013

Shading indicates exceedance of the ESV

Italicized text indicates exceedance of the BTAG Value

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* Background values are included for reference only, data has not been screened against background. Background values are equal to the 95% UTL if one exists. If no 95% UTL exists, the max background value is shown; this is the case for the following dissolved metals: aluminum, copper, selenium, and vanadium.

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3 - Laboratory Qualifier. Sample was received outside of EPA recommended holdtime of "ASAP"

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

M - Laboratory Qualifier. Matrix interference was observed and the reporting limit adjusted accordingly

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

mg/l - Milligrams per liter

ph - pH units

µg/l - Micrograms per liter

TABLE 4-8

Deep Groundwater Data Exceedance Results

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Federal MCL-Groundwater	Adjusted Tap Water RSLs	ECO Screening Value	Yorktown 95% UTL Background - Yorktown Eastover Aquifer	Yorktown Maximum Background - Yorktown Eastover Aquifer	YS24-GW01	YS24-GW02
Sample ID						YS24-GW01D-0610	YS24-GW02D-0610
Sample Date						06/15/10	06/15/10
Chemical Name							
Volatile Organic Compounds (µg/l)							
Benzene	5	0.41	110	--	--	0.5 U	0.08 J
Carbon disulfide	--	100	--	--	0.46	0.17 J	0.061 B
Chloroform	80	0.19	815	--	3.8	0.18 J	0.086 J
Ethylbenzene	700	1.5	25.0	--	--	0.057 J	0.083 J
m- and p-Xylene	--	20	--	--	--	1 U	0.13 J
o-Xylene	--	20	--	--	--	0.038 J	0.06 J
Styrene	100	160	910	--	--	0.021 J	0.5 U
Toluene	1,000	230	215	--	0.39	0.14 B	3.7
Xylene, total	10,000	20	19.0	--	--	0.038 J	0.21 J
Semivolatile Organic Compounds (µg/l)							
2-Methylnaphthalene	--	15	--	--	--	0.2 U	0.017 J
bis(2-Ethylhexyl)phthalate	6	4.8	360	--	--	34 B	1.6 J
Di-n-octylphthalate	--	370	--	--	--	7.1	5 U
Pesticide/Polychlorinated Biphenyls (µg/l)							
beta-BHC	--	0.037	25.0	--	--	0.018 B	0.018 J
Endosulfan I	--	22	0.0087	--	--	0.05 U	**0.084 J**
Heptachlor epoxide	0.2	0.0074	0.0036	--	--	0.05 U	**0.0098 J**
Explosives (µg/l)							
No Detections							
Total Metals (µg/l)							
Barium	2,000	730	200	118	178	35.1 J	28.9 J
Calcium	--	--	--	169,000	146,000	75,200	25,300
Iron	--	2,600	--	894	62,100	541	238
Magnesium	--	--		11,500	8,770	2,530 J	1,510 J
Manganese	--	88	100	57.9	279	**113**	18.4
Potassium	--	--	--	12,700	18,200	9,900	27,600

TABLE 4-8

Deep Groundwater Data Exceedance Results

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Federal MCL-Groundwater	Adjusted Tap Water RSLs	ECO Screening Value	Yorktown 95% UTL Background - Yorktown Eastover Aquifer	Yorktown Maximum Background - Yorktown Eastover Aquifer	YS24-GW01	YS24-GW02
Sample ID						YS24-GW01D-0610	YS24-GW02D-0610
Sample Date						06/15/10	06/15/10
Chemical Name							
Sodium	--	--	--	64,500	84,200	37,200	90,100
Vanadium	--	18	50	26.2	83.9	20 U	4.5 J
Zinc	--	1,100	86	4.52	146	20 U	4.3 J
Dissolved Metals (µg/l)							
Barium, Dissolved	2,000	730	200	127	97.5	33.1 J	21.5 J
Calcium, Dissolved	--	--	--	113,000	93,800	75,800	16,100
Copper, Dissolved	1,300	150	3.1	--	3	2.9 J	5 U
Magnesium, Dissolved	--	--	--	11,200	8,380	2,530 J	1,570 J
Manganese, Dissolved	--	88	100	49.5	79.7	**110**	3.8 B
Potassium, Dissolved	--	--	--	12,600	19,100	7,990	27,600
Sodium, Dissolved	--	--	--	62,800	85,100	35,000	93,900
Vanadium, Dissolved	--	18	50	--	4.3	20 U	4.1 J

Notes:

Green text indicates exceedance of Adjusted Tap Water RSLs

Blue text indicates exceedance of ECO SVs

Red text inidcated exceedance of both ECO SVs and Adjusted Tapwater RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

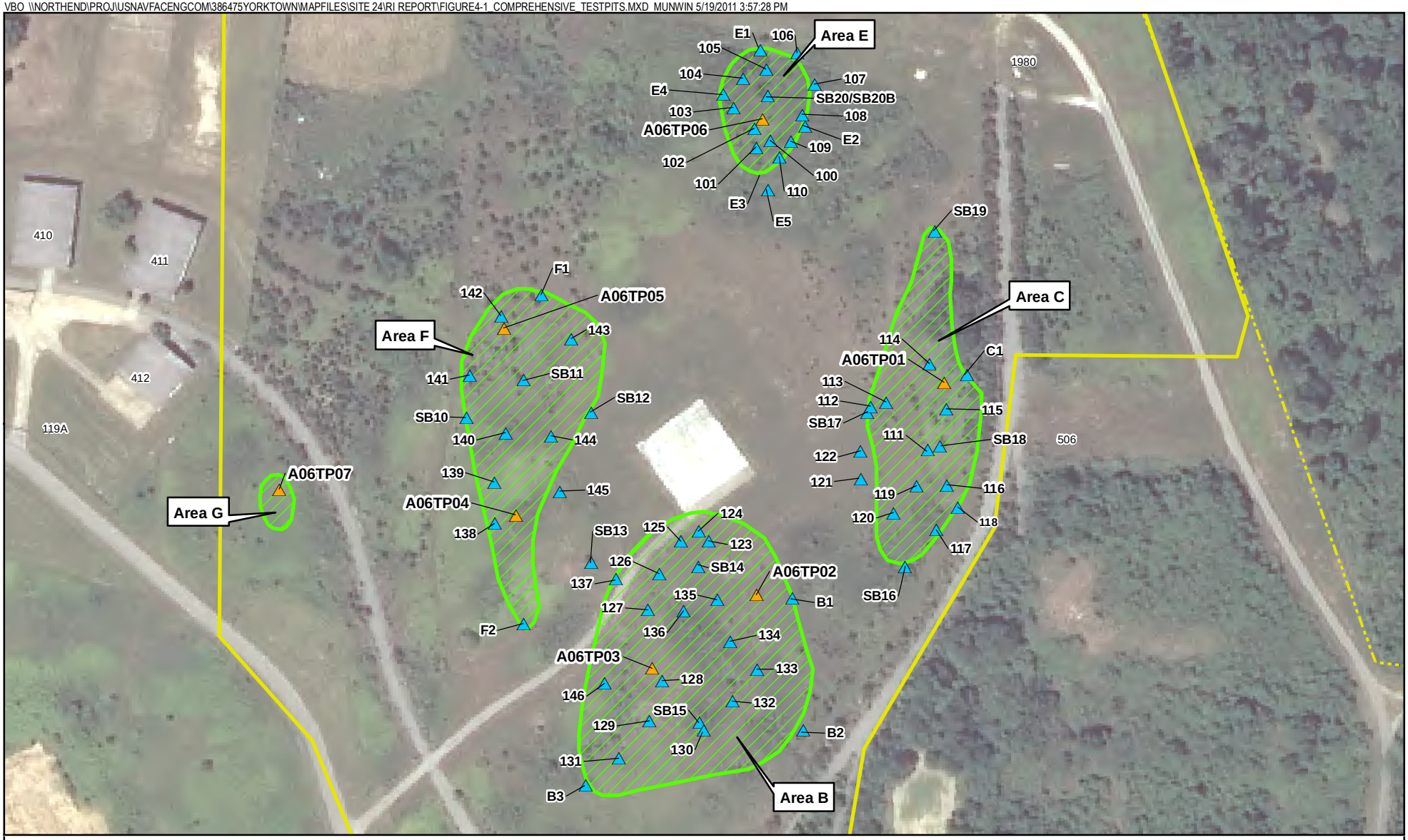
B - Analyte not detected above the level reported in blanks

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

U - The material was analyzed for, but not detected

µg/l - Micrograms per liter

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\FIGURE4-1_COMPREHENSIVE_TESTPITS.MXD MUNWIN 5/19/2011 3:57:28 PM



Legend

- Test Pit Locations (2010)
- Test Pit Locations (SSP, 1996)
- Magnetic Anomalies (SSP, 1994)
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Fences

N
W E
S

0 85 170
Feet

Figure 4-1
Comprehensive Test Pit Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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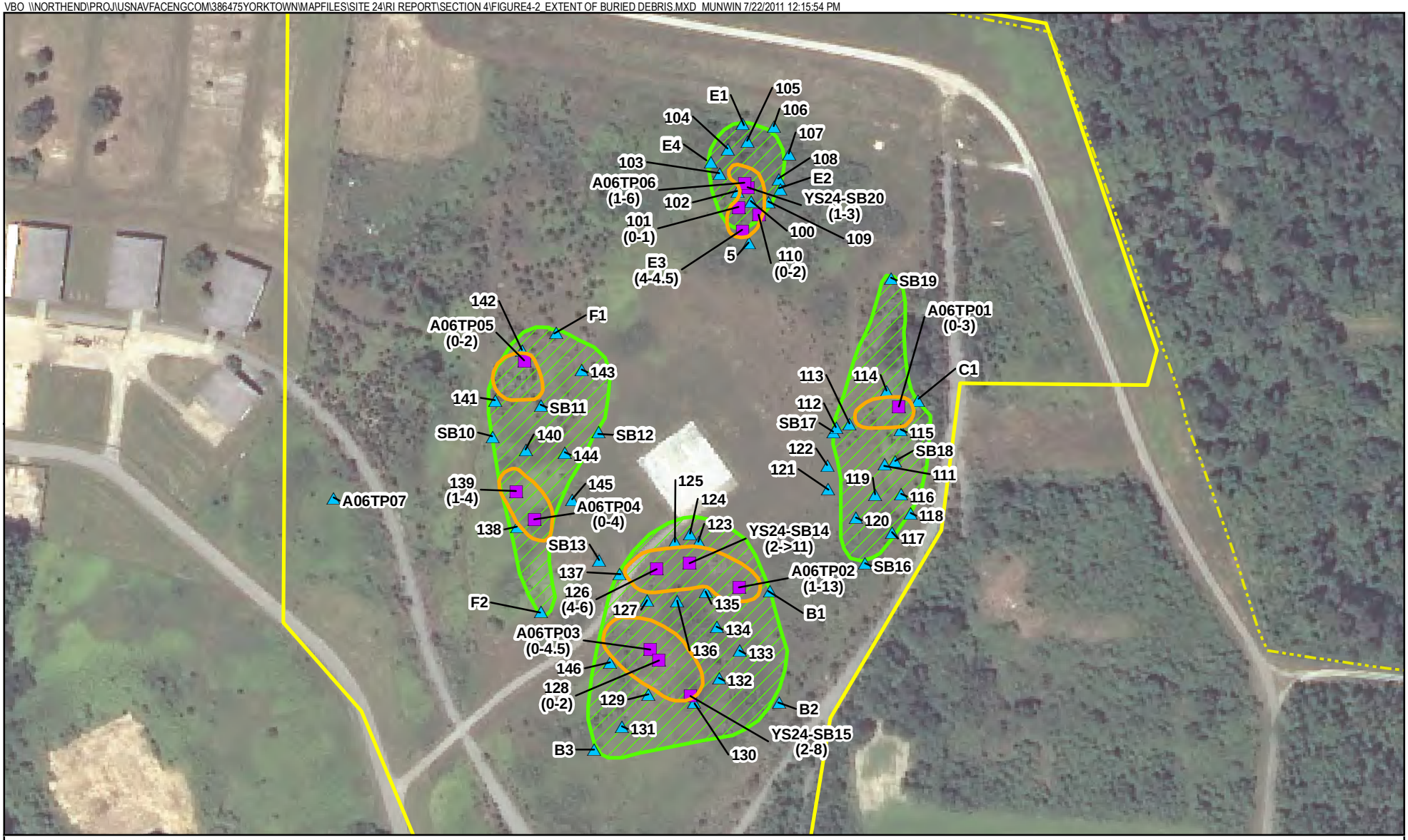
VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 4\FIGURE4-2_EXTENT OF BURIED DEBRIS.MXD MUNWIN 7/22/2011 12:15:54 PM



Legend

- Test Pits containing buried debris
- Test Pits no buried debris
- Fences
- Site 24 Boundary
- Waste Areas
- Magnetic Anomalies (SSP, 1994)

(0-2) - Depth below ground surface

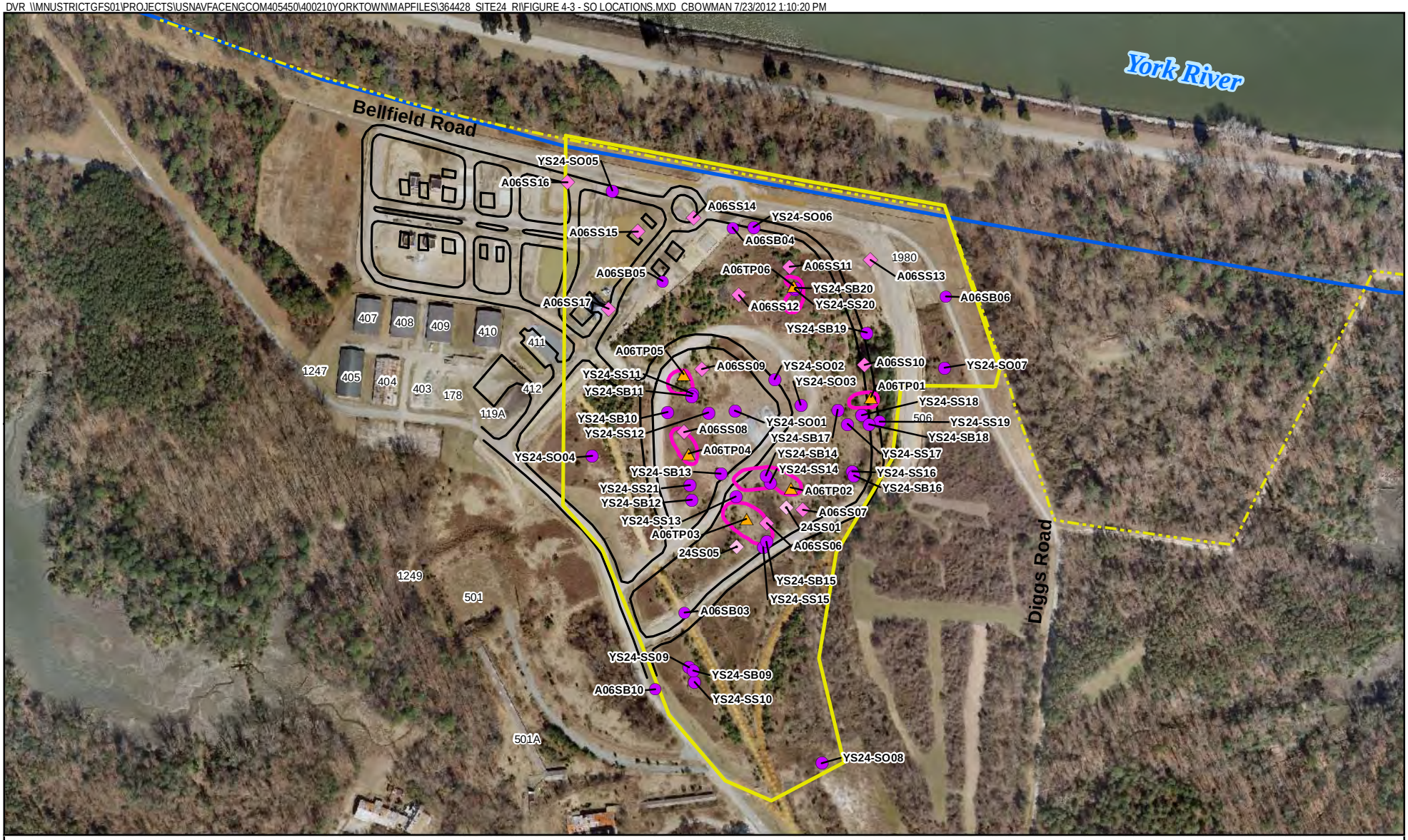
N
W E
S

0 100 200
Feet

Figure 4-2
Extent of Buried Debris
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-3 - SO LOCATIONS.MXD CBOWMAN 7/23/2012 1:10:20 PM



Legend

- Soil Sample Location (2010 RI)
- Surface Soil Sample Location (SSP, 1996)
- Surface Soil Sample Location (1997)
- Test Pit Locations (SSP, 1996)
- Fences
- JIEDDO Battle Course
- Yorktown Base Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Waste Areas

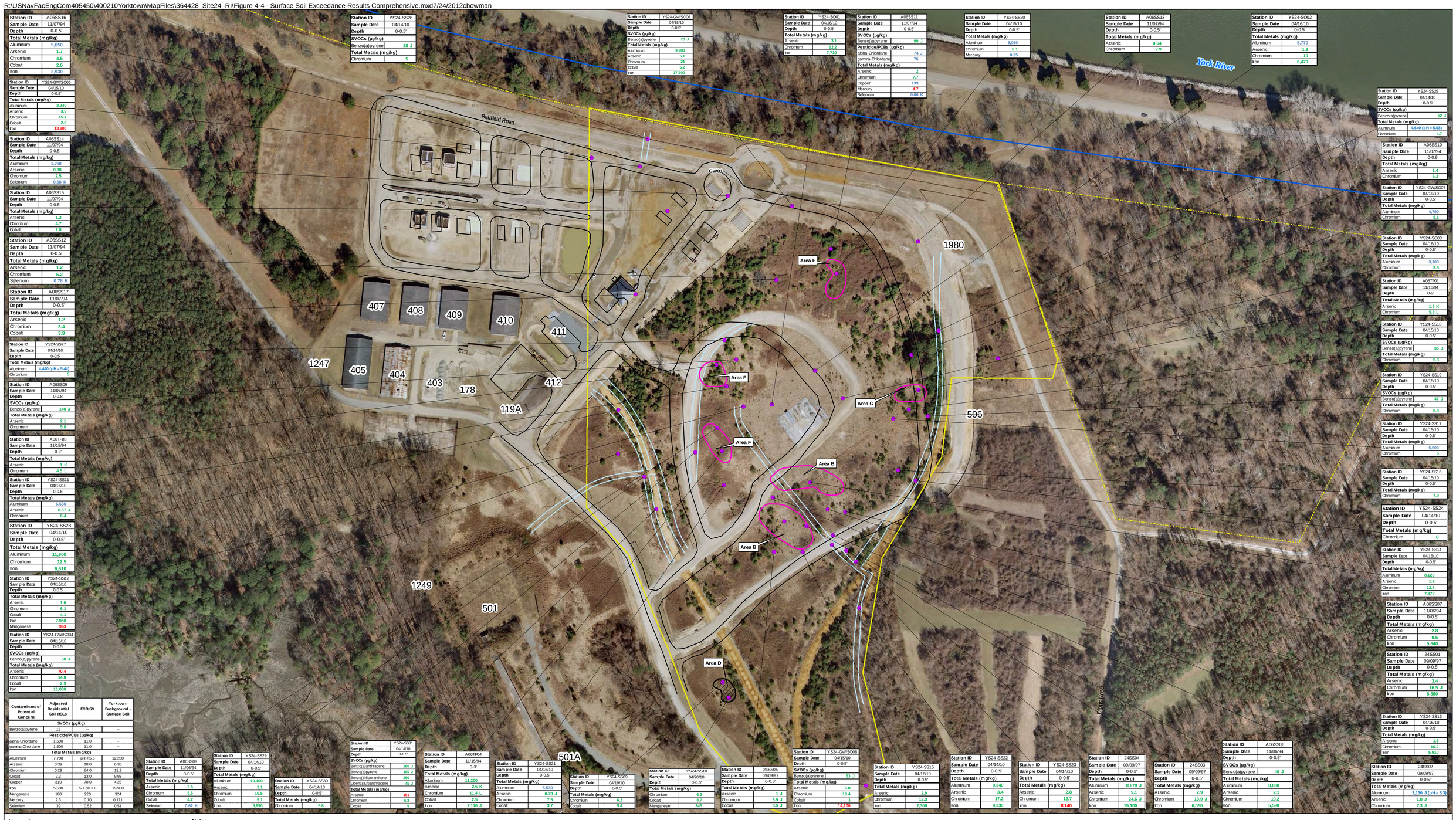
N
W E
S

0 200 400
Feet

Figure 4-3
Comprehensive Soil Sample Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

R:\USNavFacEngCom405450\400210Yorktown\MapFiles\364428 Site24 RI\Figure 4-4 - Surface Soil Exceedance Results Comprehensive.mxd7/24/2012cbowman



Station ID	A06SS16
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminium	5,650
Arsenic	1.7
Chromium	4.5
Cobalt	2.6
Iron	2,930

Station ID	YS24-GWSO05
Sample Date	04/15/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminium	8,240
Arsenic	3.9
Chromium	15.1
Cobalt	2.6
Iron	13,900

Station ID	A06SS14
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminium	1,760
Arsenic	0.88
Chromium	2.5
Selenium	0.58 K

Station ID	A06SS15
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.2
Chromium	4.7
Cobalt	2.8

Station ID	A06SS12
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.2
Chromium	5.2
Selenium	0.78 K

Station ID	A06SS17
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.2
Chromium	3.4
Cobalt	3.8

Station ID	YS24-SS27
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	4,440 (pH = 5.44)
Chromium	5

Station ID	A06SS09
Sample Date	11/07/94
Depth	0-0.8'
SVOCs (µg/kg)	
Benzo(a)pyrene	140 J
Total Metals (mg/kg)	
Arsenic	2.1
Chromium	5.8

Station ID	A06TP05
Sample Date	11/15/94
Depth	0-2'
Total Metals (mg/kg)	
Arsenic	1 K
Chromium	4.5 L

Station ID	YS24-SS11
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	6,630
Arsenic	0.67 J
Chromium	6.4

Station ID	YS24-SS28
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	11,900
Chromium	12.5
Iron	6,610

Station ID	YS24-SS12
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.6
Chromium	6.1
Cobalt	4.1
Iron	7,950
Manganese	963

Station ID	YS24-GWSO04
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	50 J
Total Metals (mg/kg)	
Arsenic	70.4
Chromium	14.8
Cobalt	2.9
Iron	11,000

Station ID	YS24-SS26
Sample Date	04/14/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	28 J
Total Metals (mg/kg)	
Chromium	5

Station ID	YS24-GWSO06
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	70 J
Total Metals (mg/kg)	
Aluminum	9,980
Arsenic	5.1
Chromium	21
Cobalt	5.2
Iron	17,700

Station ID	YS24-SO01
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	3.1
Chromium	12.2
Iron	7,710

Station ID	A06SS11
Sample Date	11/07/94
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	90 J
Pesticide/PCBs (µg/kg)	
alpha-Chlordane	74 J
gamma-Chlordane	76
Total Metals (mg/kg)	
Arsenic	2
Chromium	7.7
Copper	139
Mercury	4.7
Selenium	0.66 K

Station ID	YS24-SS20
Sample Date	04/15/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	6,050
Chromium	8.1
Mercury	0.25

Station ID	A06SS13
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	0.64
Chromium	2.9

Station ID	YS24-SO02
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	5,770
Arsenic	1.8
Chromium	10
Iron	8,470

Station ID	YS24-SS25
Sample Date	04/14/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	52 J
Total Metals (mg/kg)	
Aluminum	4,640 (pH = 5.08)
Chromium	4.7

Station ID	A06SS10
Sample Date	11/07/94
Depth	0-0.9'
Total Metals (mg/kg)	
Arsenic	1.4
Chromium	6.2

Station ID	YS24-GWSO07
Sample Date	04/19/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	4,790
Chromium	5.1

Station ID	YS24-SO03
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	3,100
Chromium	3.5

Station ID	A06TP01
Sample Date	11/16/94
Depth	0-2'
Total Metals (mg/kg)	
Arsenic	1.3 K
Chromium	5.8 L

Station ID	YS24-SS18
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	35 J
Total Metals (mg/kg)	
Chromium	5.3

Station ID	YS24-SS19
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	47 J
Total Metals (mg/kg)	
Chromium	5.9

Station ID	YS24-SS17
Sample Date	04/15/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	5,500
Chromium	5

Station ID	YS24-SS16
Sample Date	04/15/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	7.9

Station ID	YS24-SS24
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	8

Station ID	YS24-SS14
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	8,120
Arsenic	1.9
Chromium	12.8
Iron	7,370

Station ID	A06SS07
Sample Date	11/06/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.8
Chromium	9.5
Iron	5,640

Station ID	24SS01
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	3.4
Chromium	16.5 J
Iron	8,880

Station ID	YS24-SS13
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.6
Chromium	10.2
Iron	5,910

Station ID	24SS02
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	3,130 J (pH = 5.3)
Arsenic	1.8 J
Chromium	7.3 J

Station ID	A06SS06
Sample Date	11/06/94
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	40 J
Total Metals (mg/kg)	
Aluminum	8,030
Arsenic	2.1
Chromium	10.2
Iron	5,590

Station ID	24SS03
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.9
Chromium	10.9 J
Iron	6,050

Station ID	24SS04
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	8,870 J
Arsenic	9.1
Chromium	24.6 J
Iron	15,100

Station ID	YS24-SS23
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.8
Chromium	12.7
Iron	8,140

Station ID	YS24-SS22
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	9,340
Arsenic	3.4
Chromium	17.2
Iron	9,330

Station ID	YS24-SS15
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.9
Chromium	12.3
Iron	7,300

Station ID	YS24-GWSO08
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	63 J
Total Metals (mg/kg)	
Arsenic	6.8
Chromium	18.4
Cobalt	3
Iron	14,100

Station ID	24SS05
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1 J
Chromium	5.9 J
Cobalt	3.5 J

Station ID	YS24-SS10
Sample Date	04/20/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	6.2
Cobalt	8.7
Manganese	245

Station ID	A06TP04
Sample Date	11/15/94
Depth	0-3'
Total Metals (mg/kg)	
Aluminum	11,200
Arsenic	2.5 K
Chromium	11.4 L
Cobalt	2.5
Iron	7,110 J

Station ID	YS24-SS21
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	6,530
Arsenic	0.79 J
Chromium	7.5
Cobalt	3.7

Station ID	YS24-SS09
Sample Date	04/19/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	6.2
Cobalt	5.4

Station ID	YS24-SS31
Sample Date	04/14/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	160 J
Benzo(a)pyrene	180 J
Benzo(b)fluoranthene	250
Dibenz(a,h)anthracene	45 J
Total Metals (mg/kg)	
Arsenic	151
Chromium	5.3
Cobalt	9

Station ID	A06SS08
Sample Date	11/06/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.6
Chromium	5.6
Cobalt	4.2
Selenium	0.62 K

Station ID	YS24-SS29
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	10,100
Chromium	10.5
Cobalt	5.1
Iron	5,990

Station ID	YS24-SS30
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	5.8

Contaminant of Potential Concern	Adjusted Residential Soil RSLs	ECO SV	Yorktown Background - Surface Soil
SVOCs (µg/kg)			
Benzo(a)pyrene	15	--	
Pesticide/PCBs (µg/kg)			
alpha-Chlordane	1,600	11.0	--
gamma-Chlordane	1,600	11.0	--
Total Metals (mg/kg)			
Aluminum	7,700	pH < 5.5	12,200
Arsenic	0.39	18.0	6.36
Chromium	0.29	64.0	18.2
Cobalt	2.3	13.0	9.93
Copper	310	70.0	4.25
Iron	5,500	5 < pH > 8	19,900
Manganese	180	220	324
Mercury	2.3	0.10	0.111
Selenium	39	0.52	0.51

Legend

- Surface Soil Sample Locations
- Fences
- JIEDDO Battle Course
- Drainage Swales
- Naval Weapons Station Boundary
- Waste Areas
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Black Sludge-like Material (SSP, 1996)

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text indicates exceedance of both ECO SVs and Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

D - duplicate

N
W E
S

0 60 120 240 360
Feet

Figure 4-4
Comprehensive Surface Soil Exceedance Results
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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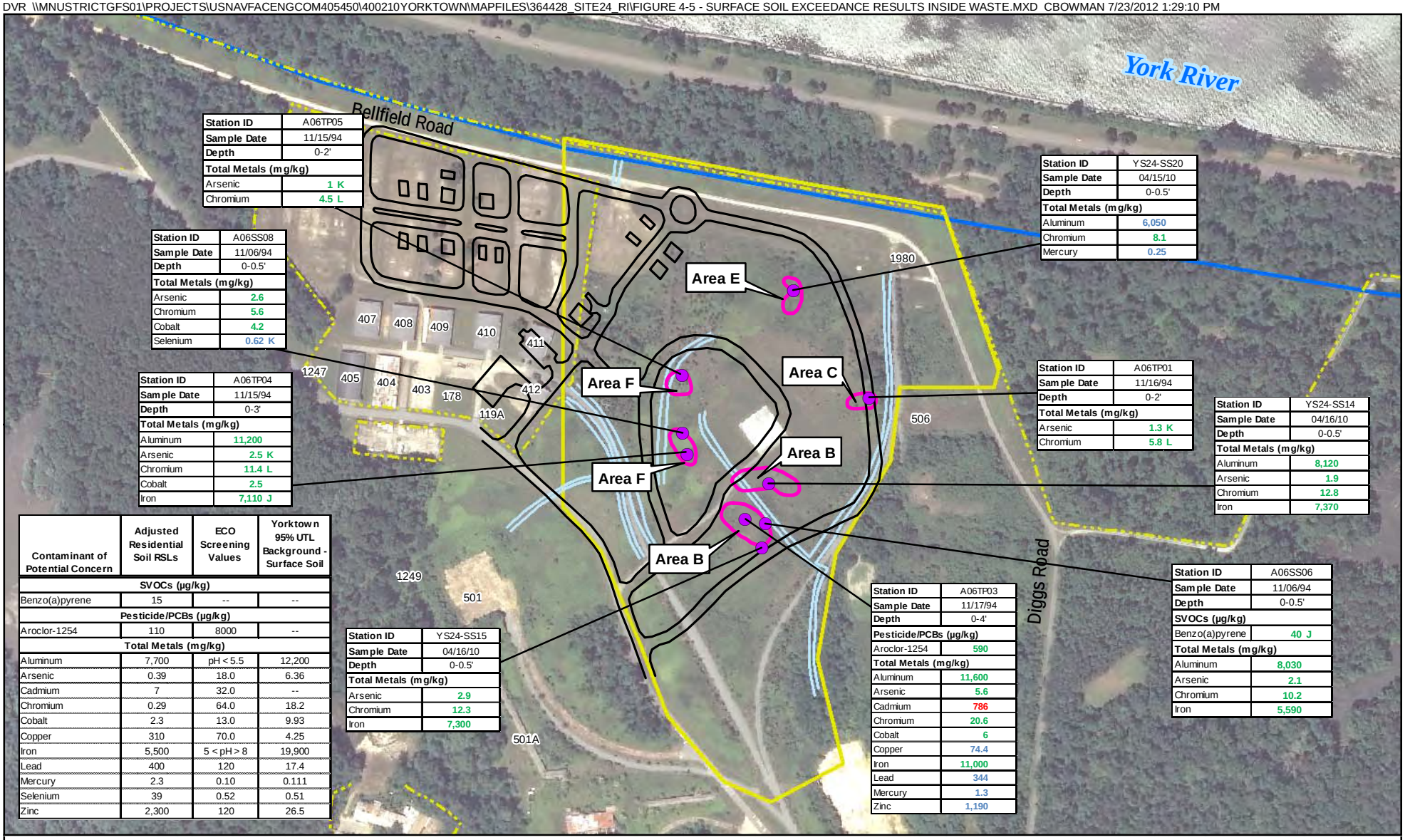
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-5 - SURFACE SOIL EXCEEDANCE RESULTS INSIDE WASTE.MXD CBOWMAN 7/23/2012 1:29:10 PM



Station ID	A06TP05
Sample Date	11/15/94
Depth	0-2'
Total Metals (mg/kg)	
Arsenic	1 K
Chromium	4.5 L

Station ID	A06SS08
Sample Date	11/06/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.6
Chromium	5.6
Cobalt	4.2
Selenium	0.62 K

Station ID	A06TP04
Sample Date	11/15/94
Depth	0-3'
Total Metals (mg/kg)	
Aluminum	11,200
Arsenic	2.5 K
Chromium	11.4 L
Cobalt	2.5
Iron	7,110 J

Station ID	YS24-SS20
Sample Date	04/15/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	6,050
Chromium	8.1
Mercury	0.25

Station ID	A06TP01
Sample Date	11/16/94
Depth	0-2'
Total Metals (mg/kg)	
Arsenic	1.3 K
Chromium	5.8 L

Station ID	YS24-SS14
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	8,120
Arsenic	1.9
Chromium	12.8
Iron	7,370

Contaminant of Potential Concern	Adjusted Residential Soil RSLs	ECO Screening Values	Yorktown 95% UTL Background - Surface Soil
SVOCs (µg/kg)			
Benzo(a)pyrene	15	--	--
Pesticide/PCBs (µg/kg)			
Aroclor-1254	110	8000	--
Total Metals (mg/kg)			
Aluminum	7,700	pH < 5.5	12,200
Arsenic	0.39	18.0	6.36
Cadmium	7	32.0	--
Chromium	0.29	64.0	18.2
Cobalt	2.3	13.0	9.93
Copper	310	70.0	4.25
Iron	5,500	5 < pH > 8	19,900
Lead	400	120	17.4
Mercury	2.3	0.10	0.111
Selenium	39	0.52	0.51
Zinc	2,300	120	26.5

Station ID	YS24-SS15
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.9
Chromium	12.3
Iron	7,300

Station ID	A06TP03
Sample Date	11/17/94
Depth	0-4'
Pesticide/PCBs (µg/kg)	
Aroclor-1254	590
Total Metals (mg/kg)	
Aluminum	11,600
Arsenic	5.6
Cadmium	786
Chromium	20.6
Cobalt	6
Copper	74.4
Iron	11,000
Lead	344
Mercury	1.3
Zinc	1,190

Station ID	A06SS06
Sample Date	11/06/94
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	40 J
Total Metals (mg/kg)	
Aluminum	8,030
Arsenic	2.1
Chromium	10.2
Iron	5,590

Legend

- Surface Soil Sample Locations
- Fences
- JIEDDO Battle Course
- Drainage Swales
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Waste Areas
- Naval Weapons Station Boundary

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text indicates exceedance of both ECO SVs and Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

N W E S

0 200 400 Feet

Figure 4-5
Surface Soil Exceedance Results
Inside the Estimated Buried Debris Boundary
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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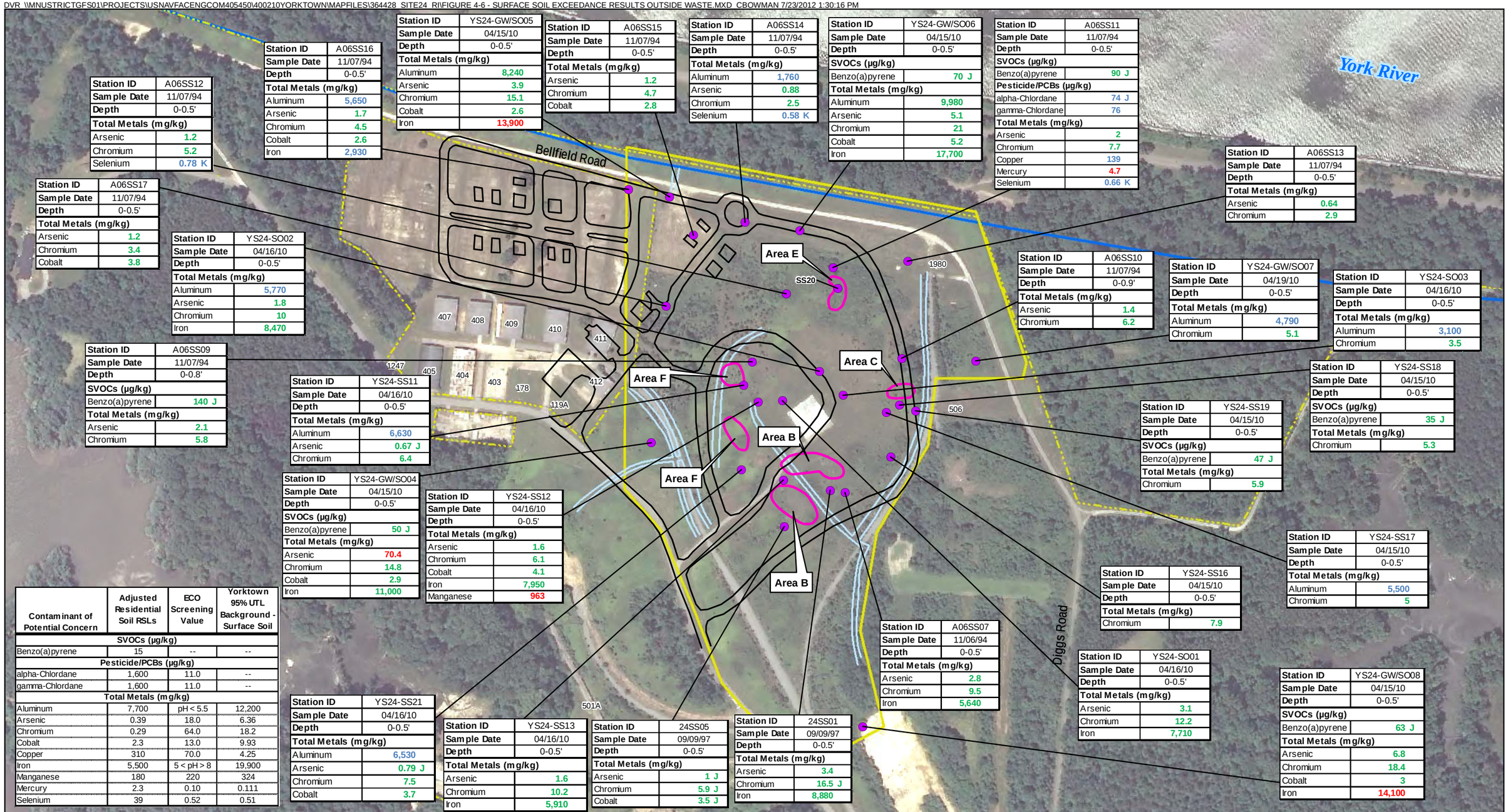
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-6 - SURFACE SOIL EXCEEDANCE RESULTS OUTSIDE WASTE.MXD CBOWMAN 7/23/2012 1:30:16 PM



Station ID	A06SS16
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	5,650
Arsenic	1.7
Chromium	4.5
Cobalt	2.6
Iron	2,930

Station ID	YS24-GW/SO05
Sample Date	04/15/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	8,240
Arsenic	3.9
Chromium	15.1
Cobalt	2.6
Iron	13,900

Station ID	A06SS15
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.2
Chromium	4.7
Cobalt	2.8

Station ID	A06SS14
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	1,760
Arsenic	0.88
Chromium	2.5
Selenium	0.58 K

Station ID	YS24-GW/SO06
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	70 J
Total Metals (mg/kg)	
Aluminum	9,980
Arsenic	5.1
Chromium	21
Cobalt	5.2
Iron	17,700

Station ID	A06SS11
Sample Date	11/07/94
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	90 J
Pesticide/PCBs (µg/kg)	
alpha-Chlordane	74 J
gamma-Chlordane	76
Total Metals (mg/kg)	
Arsenic	2
Chromium	7.7
Copper	139
Mercury	4.7
Selenium	0.66 K

Station ID	A06SS12
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.2
Chromium	5.2
Selenium	0.78 K

Station ID	A06SS13
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	0.64
Chromium	2.9

Station ID	A06SS17
Sample Date	11/07/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.2
Chromium	3.4
Cobalt	3.8

Station ID	YS24-SO02
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	5,770
Arsenic	1.8
Chromium	10
Iron	8,470

Station ID	A06SS10
Sample Date	11/07/94
Depth	0-0.9'
Total Metals (mg/kg)	
Arsenic	1.4
Chromium	6.2

Station ID	YS24-GW/SO07
Sample Date	04/19/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	4,790
Chromium	5.1

Station ID	YS24-SO03
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	3,100
Chromium	3.5

Station ID	A06SS09
Sample Date	11/07/94
Depth	0-0.8'
SVOCs (µg/kg)	
Benzo(a)pyrene	140 J
Total Metals (mg/kg)	
Arsenic	2.1
Chromium	5.8

Station ID	YS24-SS11
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	6,630
Arsenic	0.67 J
Chromium	6.4

Station ID	YS24-SS18
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	35 J
Total Metals (mg/kg)	
Chromium	5.3

Station ID	YS24-SS19
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	47 J
Total Metals (mg/kg)	
Chromium	5.9

Station ID	YS24-GW/SO04
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	50 J
Total Metals (mg/kg)	
Arsenic	70.4
Chromium	14.8
Cobalt	2.9
Iron	11,000

Station ID	YS24-SS12
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.6
Chromium	6.1
Cobalt	4.1
Iron	7,950
Manganese	963

Station ID	YS24-SS17
Sample Date	04/15/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	5,500
Chromium	5

Station ID	YS24-SS16
Sample Date	04/15/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	7.9

Station ID	A06SS07
Sample Date	11/06/94
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.8
Chromium	9.5
Iron	5,640

Station ID	YS24-SO01
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	3.1
Chromium	12.2
Iron	7,710

Station ID	YS24-GW/SO08
Sample Date	04/15/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	63 J
Total Metals (mg/kg)	
Arsenic	6.8
Chromium	18.4
Cobalt	3
Iron	14,100

Station ID	YS24-SS21
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	6,530
Arsenic	0.79 J
Chromium	7.5
Cobalt	3.7

Station ID	YS24-SS13
Sample Date	04/16/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1.6
Chromium	10.2
Iron	5,910

Station ID	24SS05
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	1 J
Chromium	5.9 J
Cobalt	3.5 J

Station ID	24SS01
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	3.4
Chromium	16.5 J
Iron	8,880

Contaminant of Potential Concern	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95% UTL Background - Surface Soil
SVOCs (µg/kg)			
Benzo(a)pyrene	15	--	--
Pesticide/PCBs (µg/kg)			
alpha-Chlordane	1,600	11.0	--
gamma-Chlordane	1,600	11.0	--
Total Metals (mg/kg)			
Aluminum	7,700	pH < 5.5	12,200
Arsenic	0.39	18.0	6.36
Chromium	0.29	64.0	18.2
Cobalt	2.3	13.0	9.93
Copper	310	70.0	4.25
Iron	5,500	5 < pH > 8	19,900
Manganese	180	220	324
Mercury	2.3	0.10	0.111
Selenium	39	0.52	0.51

Legend

- Surface Soil Sample Locations
- Fences
- JIEDDO Battle Course
- Drainage Swales
- Waste Areas
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Naval Weapons Station Boundary

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text indicates exceedance of both ECO SVs and Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

D - duplicate

N W E S

0 300 600 Feet

Figure 4-6
Surface Soil Exceedance Results
Outside the Estimated Buried Debris Boundary
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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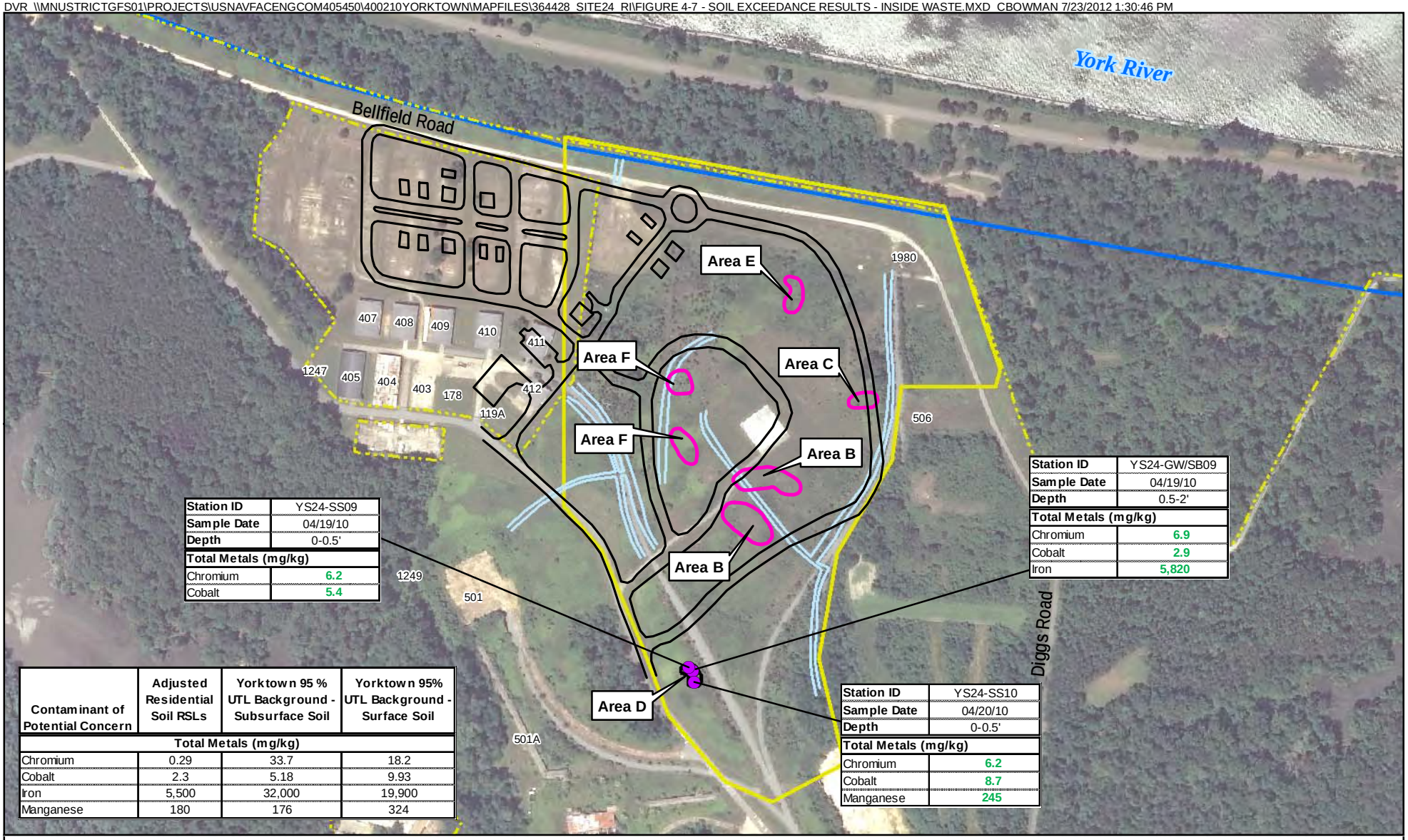
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-7 - SOIL EXCEEDANCE RESULTS - INSIDE WASTE.MXD CBOWMAN 7/23/2012 1:30:46 PM



Station ID	YS24-SS09
Sample Date	04/19/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	6.2
Cobalt	5.4

Station ID	YS24-GW/SB09
Sample Date	04/19/10
Depth	0.5-2'
Total Metals (mg/kg)	
Chromium	6.9
Cobalt	2.9
Iron	5,820

Station ID	YS24-SS10
Sample Date	04/20/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	6.2
Cobalt	8.7
Manganese	245

Contaminant of Potential Concern	Adjusted Residential Soil RSLs	Yorktown 95 % UTL Background - Subsurface Soil	Yorktown 95% UTL Background - Surface Soil
Total Metals (mg/kg)			
Chromium	0.29	33.7	18.2
Cobalt	2.3	5.18	9.93
Iron	5,500	32,000	19,900
Manganese	180	176	324

Legend
- Soil Sample Locations
- Fences
- JIEDDO Battle Course
- Drainage Swales
- Black Sludge-like Material (SSP, 1996)
- Waste Areas
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Naval Weapons Station Boundary

Notes:
Green text indicates exceedance of Adjusted Residential Soil RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
mg/kg - Milligrams per kilogram

N W E S

0 200 400 Feet

Figure 4-7
Soil Exceedance Results
Within the Sludge Area
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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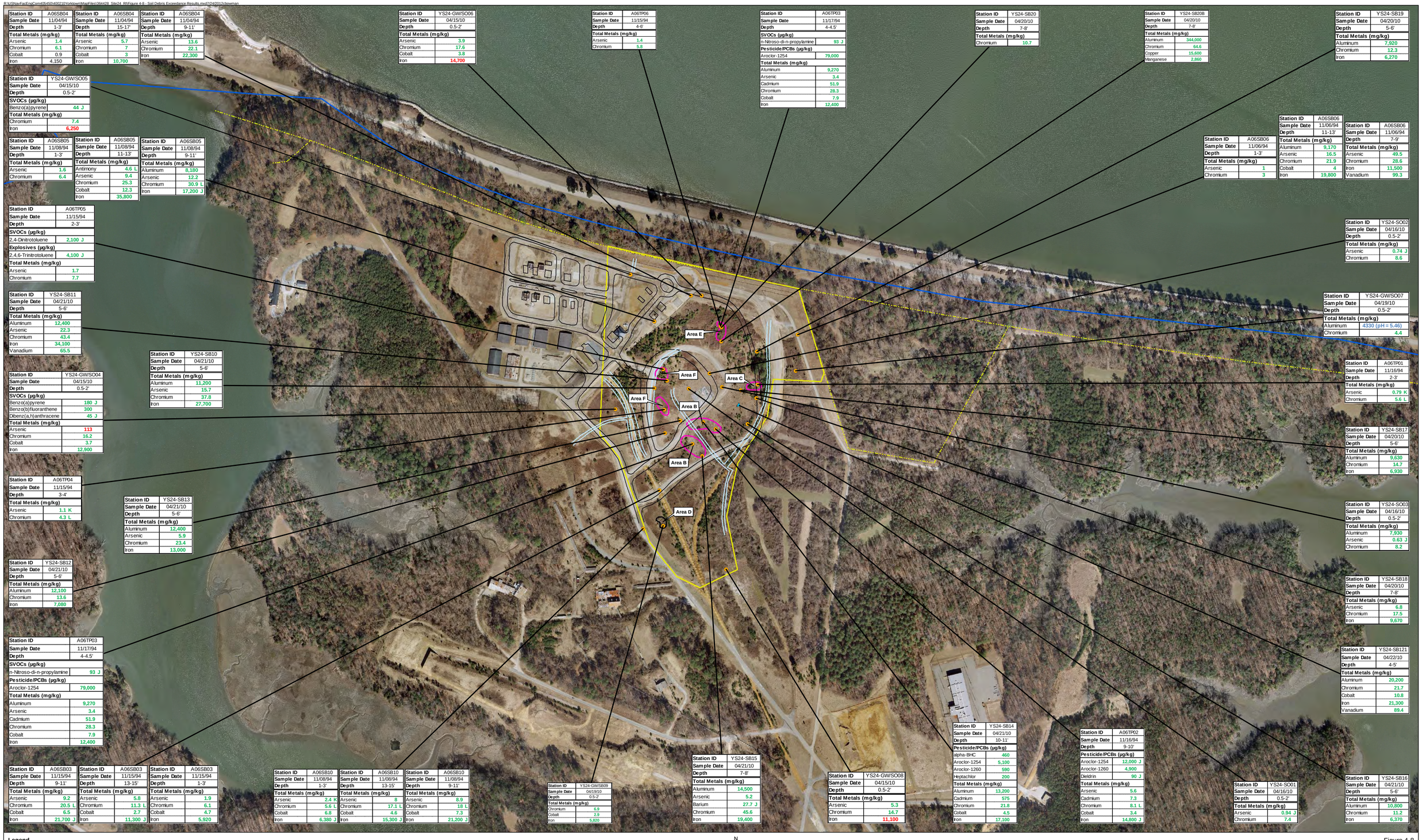
P:\USNavFacEngCom\60450\400210\Yorktown\MapFiles\364428_Site24_RIfFigure 4-8 - Soil Debris Exceedance Results.mxd7/24/2012browman



Station ID	A06SB04
Sample Date	11/04/94
Depth	1-3'
Total Metals (mg/kg)	
Arsenic	1.4
Chromium	6.1
Cobalt	0.9
Iron	4,150

Station ID	A06SB04
Sample Date	11/04/94
Depth	15-17'
Total Metals (mg/kg)	
Arsenic	5.7
Chromium	7
Cobalt	3
Iron	10,700

Station ID	A06SB04
Sample Date	11/04/94
Depth	9-11'
Total Metals (mg/kg)	
Arsenic	13.6
Chromium	22.1
Iron	22,300

Station ID	YS24-GW/SO06
Sample Date	04/15/10
Depth	0.5-2'
Total Metals (mg/kg)	
Arsenic	3.9
Chromium	17.6
Cobalt	3.8
Iron	14,700

Station ID	A06TP06
Sample Date	11/15/94
Depth	4-6'
Total Metals (mg/kg)	
Arsenic	1.4
Chromium	5.8

Station ID	A06TP03
Sample Date	11/17/94
Depth	4-4.5'
SVOCs (µg/kg)	
n-Nitroso-di-n-propylamine	93 J
Pesticide/PCBs (µg/kg)	
Aroclor-1254	79,000
Total Metals (mg/kg)	
Aluminum	9,270
Arsenic	3.4
Cadmium	51.9
Chromium	28.3
Cobalt	7.9
Iron	12,400

Station ID	YS24-SB20
Sample Date	04/20/10
Depth	7-8'
Total Metals (mg/kg)	
Chromium	10.7

Station ID	YS24-SB20B
Sample Date	04/20/10
Depth	7-8'
Total Metals (mg/kg)	
Aluminum	344,000
Chromium	64.6
Copper	15,600
Manganese	2,860

Station ID	YS24-SB19
Sample Date	04/20/10
Depth	5-6'
Total Metals (mg/kg)	
Aluminum	7,920
Chromium	12.3
Iron	6,270

Station ID	YS24-GW/SO05
Sample Date	04/15/10
Depth	0.5-2'
SVOCs (µg/kg)	
Benzo(a)pyrene	44 J
Total Metals (mg/kg)	
Chromium	7.4
Iron	6,250

Station ID	A06SB05
Sample Date	11/08/94
Depth	1-3'
Total Metals (mg/kg)	
Arsenic	1.6
Chromium	6.4

Station ID	A06SB05
Sample Date	11/08/94
Depth	11-13'
Total Metals (mg/kg)	
Antimony	4.6 L
Arsenic	9.4
Chromium	25.3
Cobalt	12.3
Iron	35,800

Station ID	A06SB05
Sample Date	11/08/94
Depth	9-11'
Total Metals (mg/kg)	
Aluminum	8,180
Arsenic	12.2
Chromium	30.9 L
Iron	17,200 J

Station ID	A06SB06
Sample Date	11/06/94
Depth	1-3'
Total Metals (mg/kg)	
Arsenic	1
Chromium	3

Station ID	A06SB06
Sample Date	11/06/94
Depth	11-13'
Total Metals (mg/kg)	
Aluminum	9,170
Arsenic	16.5
Chromium	21.9
Cobalt	4
Iron	19,800

Station ID	A06SB06
Sample Date	11/06/94
Depth	9-9'
Total Metals (mg/kg)	
Arsenic	49.5
Chromium	28.6
Iron	11,500
Vanadium	99.3

Station ID	A06TP05
Sample Date	11/15/94
Depth	2-3'
SVOCs (µg/kg)	
2,4-Dinitrotoluene	2,100 J
Explosives (µg/kg)	
2,4,6-Trinitrotoluene	4,100 J
Total Metals (mg/kg)	
Arsenic	1.7
Chromium	7.7

Station ID	YS24-SO02
Sample Date	04/16/10
Depth	0.5-2'
Total Metals (mg/kg)	
Arsenic	0.74 J
Chromium	8.6

Station ID	YS24-SB11
Sample Date	04/21/10
Depth	5-6'
Total Metals (mg/kg)	
Aluminum	12,400
Arsenic	22.3
Chromium	43.4
Iron	34,100
Vanadium	65.5

Station ID	YS24-GW/SO07
Sample Date	04/19/10
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	4330 (pH = 5.46)
Chromium	4.4

Station ID	YS24-SB10
Sample Date	04/21/10
Depth	5-6'
Total Metals (mg/kg)	
Aluminum	11,200
Arsenic	15.7
Chromium	37.8
Iron	27,700

Station ID	A06TP01
Sample Date	11/16/94
Depth	2-3'
Total Metals (mg/kg)	
Arsenic	0.79 K
Chromium	5.6 L

Station ID	YS24-GW/SO04
Sample Date	04/15/10
Depth	0.5-2'
SVOCs (µg/kg)	
Benzo(a)pyrene	180 J
Benzo(b)fluoranthene	300
Dibenz(a,h)anthracene	45 J
Total Metals (mg/kg)	
Arsenic	113
Chromium	16.2
Cobalt	3.7
Iron	12,900

Station ID	YS24-SB17
Sample Date	04/20/10
Depth	5-6'
Total Metals (mg/kg)	
Aluminum	9,630
Chromium	14.7
Iron	6,930

Station ID	A06TP04
Sample Date	11/15/94
Depth	3-4'
Total Metals (mg/kg)	
Arsenic	1.1 K
Chromium	4.3 L

Station ID	YS24-SB13
Sample Date	04/21/10
Depth	5-6'
Total Metals (mg/kg)	
Aluminum	12,400
Arsenic	5.9
Chromium	23.4
Iron	13,000

Station ID	YS24-SO03
Sample Date	04/16/10
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	7,930
Arsenic	0.63 J
Chromium	8.2

Station ID	YS24-SB12
Sample Date	04/21/10
Depth	5-6'
Total Metals (mg/kg)	
Aluminum	12,100
Chromium	13.6
Iron	7,080

Station ID	YS24-SB18
Sample Date	04/20/10
Depth	7-8'
Total Metals (mg/kg)	
Arsenic	6.8
Chromium	17.5
Iron	9,670

Station ID	A06TP03
Sample Date	11/17/94
Depth	4-4.5'
SVOCs (µg/kg)	
n-Nitroso-di-n-propylamine	93 J
Pesticide/PCBs (µg/kg)	
Aroclor-1254	79,000
Total Metals (mg/kg)	
Aluminum	9,270
Arsenic	3.4
Cadmium	51.9
Chromium	28.3
Cobalt	7.9
Iron	12,400

Station ID	YS24-SB121
Sample Date	04/22/10
Depth	4-5'
Total Metals (mg/kg)	
Aluminum	20,200
Chromium	21.7
Cobalt	10.8
Iron	21,300
Vanadium	89.4

Station ID	A06SB03
Sample Date	11/15/94
Depth	9-11'
Total Metals (mg/kg)	
Arsenic	9.2
Chromium	20.5 L
Cobalt	6.5
Iron	21,700 J

Station ID	A06SB03
Sample Date	11/15/94
Depth	13-15'
Total Metals (mg/kg)	
Arsenic	5.8
Chromium	11.3 L
Cobalt	2.7
Iron	11,300 J

Station ID	A06SB03
Sample Date	11/15/94
Depth	1-3'
Total Metals (mg/kg)	
Arsenic	1.9
Chromium	6.1
Cobalt	4.7
Iron	5,920

Station ID	A06SB10
Sample Date	11/08/94
Depth	1-3'
Total Metals (mg/kg)	
Arsenic	2.4 K
Chromium	5.6 L
Cobalt	6.8
Iron	6,380 J

Station ID	A06SB10
Sample Date	11/08/94
Depth	13-15'
Total Metals (mg/kg)	
Arsenic	8
Chromium	17.1 L
Cobalt	4.6
Iron	15,300 J

Station ID	A06SB10
Sample Date	11/08/94
Depth	9-11'
Total Metals (mg/kg)	
Arsenic	8.9
Chromium	18 L
Cobalt	7.3
Iron	21,200 J

Station ID	YS24-GW/SB09
Sample Date	04/19/10
Depth	0.5-2'
Total Metals (mg/kg)	
Chromium	6.9
Cobalt	2.9
Iron	5,820

Station ID	YS24-SB15
Sample Date	04/21/10
Depth	7-8'
Total Metals (mg/kg)	
Aluminum	14,500
Arsenic	5.2
Barium	27.7 J
Chromium	45.6
Iron	19,400

Station ID	YS24-GW/SO08
Sample Date	04/15/10
Depth	0.5-2'
Total Metals (mg/kg)	
Arsenic	5.3
Chromium	14.7
Iron	11,100

Station ID	YS24-SB14
Sample Date	04/21/10
Depth	10-11'
Pesticide/PCBs (µg/kg)	
alpha-BHC	460
Aroclor-1254	5,100
Aroclor-1260	590
Heptachlor	200
Total Metals (mg/kg)	
Aluminum	13,200
Cadmium	575
Chromium	21.8
Cobalt	4.5
Iron	17,100

Station ID	A06TP02
Sample Date	11/16/94
Depth	9-10'
Pesticide/PCBs (µg/kg)	
Aroclor-1254	12,000 J
Aroclor-1260	4,900
Dieldrin	90 J
Total Metals (mg/kg)	
Arsenic	5.6
Cadmium	7.3
Chromium	8.1 L
Cobalt	3.4
Iron	14,800 J

Station ID	YS24-SO01
Sample Date	04/16/10
Depth	0.5-2'
Total Metals (mg/kg)	
Arsenic	0.94 J
Chromium	7.4

Station ID	YS24-SB16
Sample Date	04/21/10
Depth	5-6'
Total Metals (mg/kg)	
Aluminum	10,800
Chromium	11.2
Iron	6,370

Legend

- Test Pit Locations (2010)
- Subsurface Soil Sample Locations
- Drainage
- Fences
- JIEDDO Battle Course
- Black Sludge-like Material (SSP, 1996)
- Waste Areas
- Site 24 Investigation Area (former SSA 6 Helicopter Pad Area)
- Naval Weapons Station Boundary
- buildings and structures

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0 125 250 500 Feet

Figure 4-8
Soil Debris Exceedance Results
Inside the Estimated Buried Debris Boundary
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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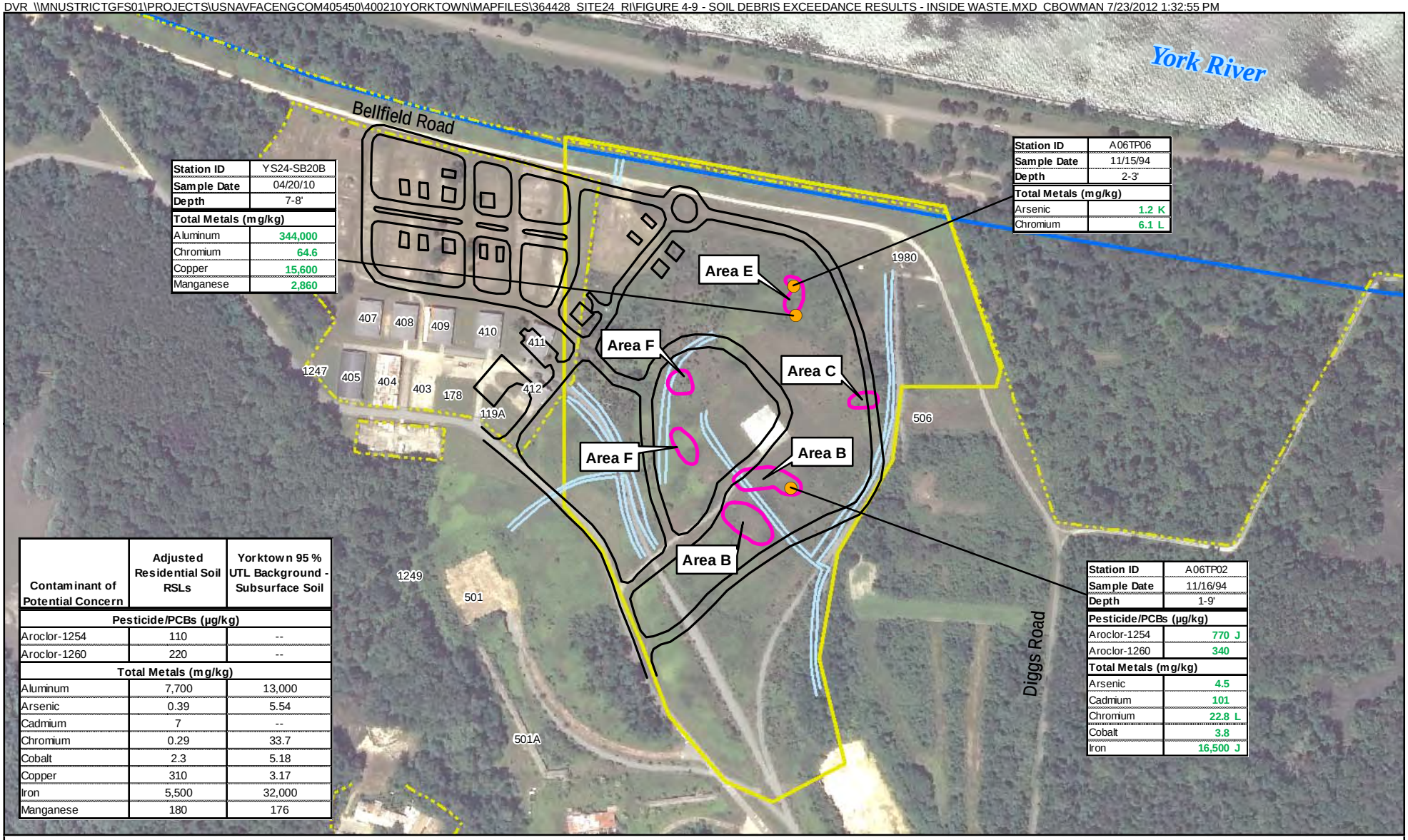
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-9 - SOIL DEBRIS EXCEEDANCE RESULTS - INSIDE WASTE.MXD CBOWMAN 7/23/2012 1:32:55 PM



Station ID	YS24-SB20B
Sample Date	04/20/10
Depth	7-8'
Total Metals (mg/kg)	
Aluminum	344,000
Chromium	64.6
Copper	15,600
Manganese	2,860

Station ID	A06TP06
Sample Date	11/15/94
Depth	2-3'
Total Metals (mg/kg)	
Arsenic	1.2 K
Chromium	6.1 L

Station ID	A06TP02
Sample Date	11/16/94
Depth	1-9'
Pesticide/PCBs (µg/kg)	
Aroclor-1254	770 J
Aroclor-1260	340
Total Metals (mg/kg)	
Arsenic	4.5
Cadmium	101
Chromium	22.8 L
Cobalt	3.8
Iron	16,500 J

Contaminant of Potential Concern	Adjusted Residential Soil RSLs	Yorktown 95% UTL Background - Subsurface Soil
Pesticide/PCBs (µg/kg)		
Aroclor-1254	110	--
Aroclor-1260	220	--
Total Metals (mg/kg)		
Aluminum	7,700	13,000
Arsenic	0.39	5.54
Cadmium	7	--
Chromium	0.29	33.7
Cobalt	2.3	5.18
Copper	310	3.17
Iron	5,500	32,000
Manganese	180	176

Legend

- Subsurface Soil Sample Locations
- Fences
- JIEDDO Battle Course
- Drainage Swales
- Waste Areas
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Naval Weapons Station Boundary

Notes:

Green text indicates exceedance of Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

N W E S

0 200 400 Feet

Figure 4-9
Soil Debris Exceedance Results
Inside the Estimated Buried Debris Boundary
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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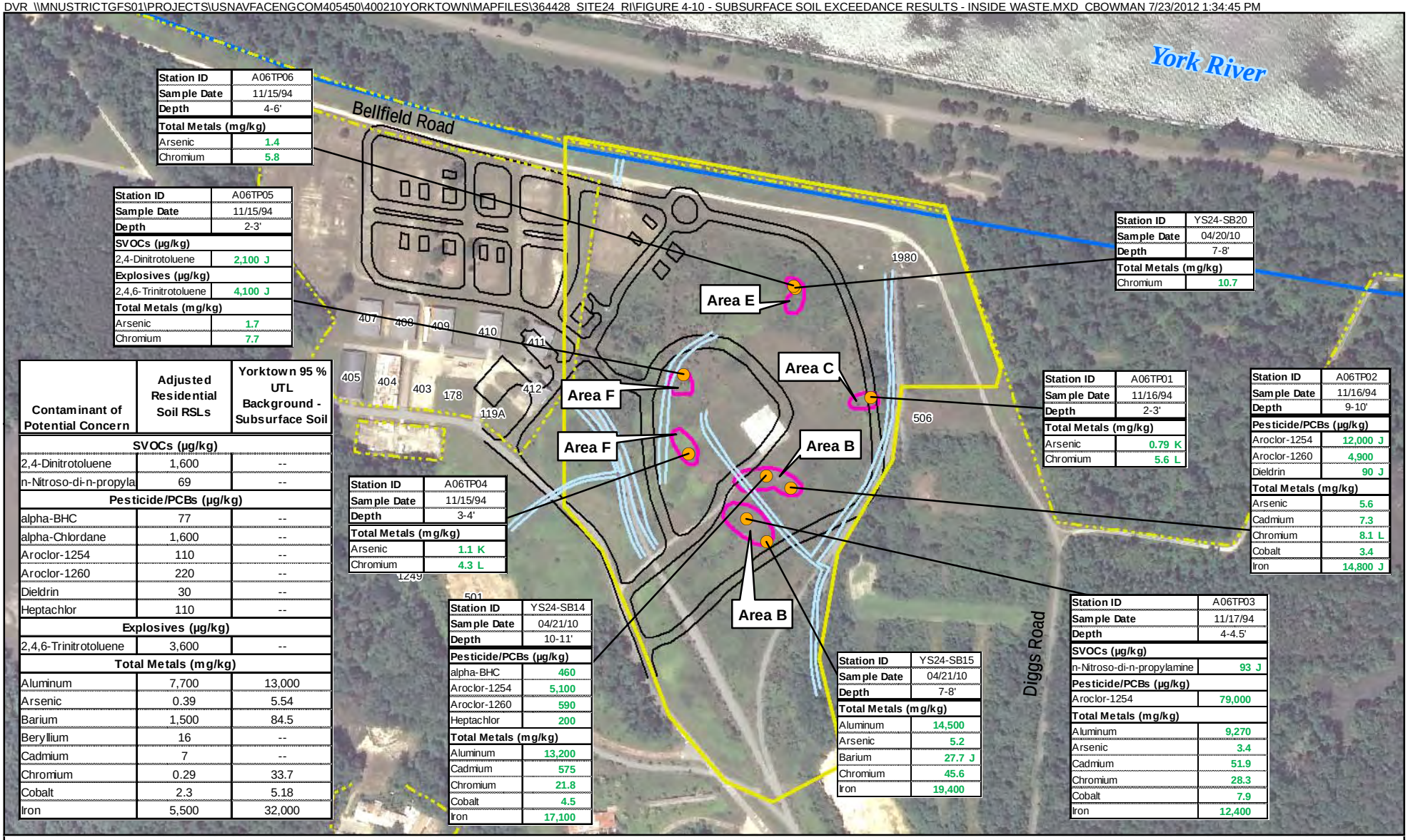
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-10 - SUBSURFACE SOIL EXCEEDANCE RESULTS - INSIDE WASTE.MXD CBOWMAN 7/23/2012 1:34:45 PM



Station ID	A06TP06
Sample Date	11/15/94
Depth	4-6'
Total Metals (mg/kg)	
Arsenic	1.4
Chromium	5.8

Station ID	A06TP05
Sample Date	11/15/94
Depth	2-3'
SVOCs (µg/kg)	
2,4-Dinitrotoluene	2,100 J
Explosives (µg/kg)	
2,4,6-Trinitrotoluene	4,100 J
Total Metals (mg/kg)	
Arsenic	1.7
Chromium	7.7

Station ID	YS24-SB20
Sample Date	04/20/10
Depth	7-8'
Total Metals (mg/kg)	
Chromium	10.7

Station ID	A06TP01
Sample Date	11/16/94
Depth	2-3'
Total Metals (mg/kg)	
Arsenic	0.79 K
Chromium	5.6 L

Station ID	A06TP02
Sample Date	11/16/94
Depth	9-10'
Pesticide/PCBs (µg/kg)	
Aroclor-1254	12,000 J
Aroclor-1260	4,900
Dieldrin	90 J
Total Metals (mg/kg)	
Arsenic	5.6
Cadmium	7.3
Chromium	8.1 L
Cobalt	3.4
Iron	14,800 J

Station ID	A06TP04
Sample Date	11/15/94
Depth	3-4'
Total Metals (mg/kg)	
Arsenic	1.1 K
Chromium	4.3 L

Station ID	YS24-SB14
Sample Date	04/21/10
Depth	10-11'
Pesticide/PCBs (µg/kg)	
alpha-BHC	460
Aroclor-1254	5,100
Aroclor-1260	590
Heptachlor	200
Total Metals (mg/kg)	
Aluminum	13,200
Cadmium	575
Chromium	21.8
Cobalt	4.5
Iron	17,100

Station ID	YS24-SB15
Sample Date	04/21/10
Depth	7-8'
Total Metals (mg/kg)	
Aluminum	14,500
Arsenic	5.2
Barium	27.7 J
Chromium	45.6
Iron	19,400

Station ID	A06TP03
Sample Date	11/17/94
Depth	4-4.5'
SVOCs (µg/kg)	
n-Nitroso-di-n-propylamine	93 J
Pesticide/PCBs (µg/kg)	
Aroclor-1254	79,000
Total Metals (mg/kg)	
Aluminum	9,270
Arsenic	3.4
Cadmium	51.9
Chromium	28.3
Cobalt	7.9
Iron	12,400

Contaminant of Potential Concern	Adjusted Residential Soil RSLs	Yorktown 95 % UTL Background - Subsurface Soil
SVOCs (µg/kg)		
2,4-Dinitrotoluene	1,600	--
n-Nitroso-di-n-propyla	69	--
Pesticide/PCBs (µg/kg)		
alpha-BHC	77	--
alpha-Chlordane	1,600	--
Aroclor-1254	110	--
Aroclor-1260	220	--
Dieldrin	30	--
Heptachlor	110	--
Explosives (µg/kg)		
2,4,6-Trinitrotoluene	3,600	--
Total Metals (mg/kg)		
Aluminum	7,700	13,000
Arsenic	0.39	5.54
Barium	1,500	84.5
Beryllium	16	--
Cadmium	7	--
Chromium	0.29	33.7
Cobalt	2.3	5.18
Iron	5,500	32,000

Legend

- Subsurface Soil Sample Locations
- JIEDDO Battle Course
- Fences
- Drainage Swales
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Naval Weapons Station Boundary

Notes:

Green text indicates exceedance of Adjusted Residential Soil RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
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
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

N W E S

0 200 400 Feet

Figure 4-10
Subsurface Soil Exceedance Results
Inside the Estimated Buried Debris Boundary
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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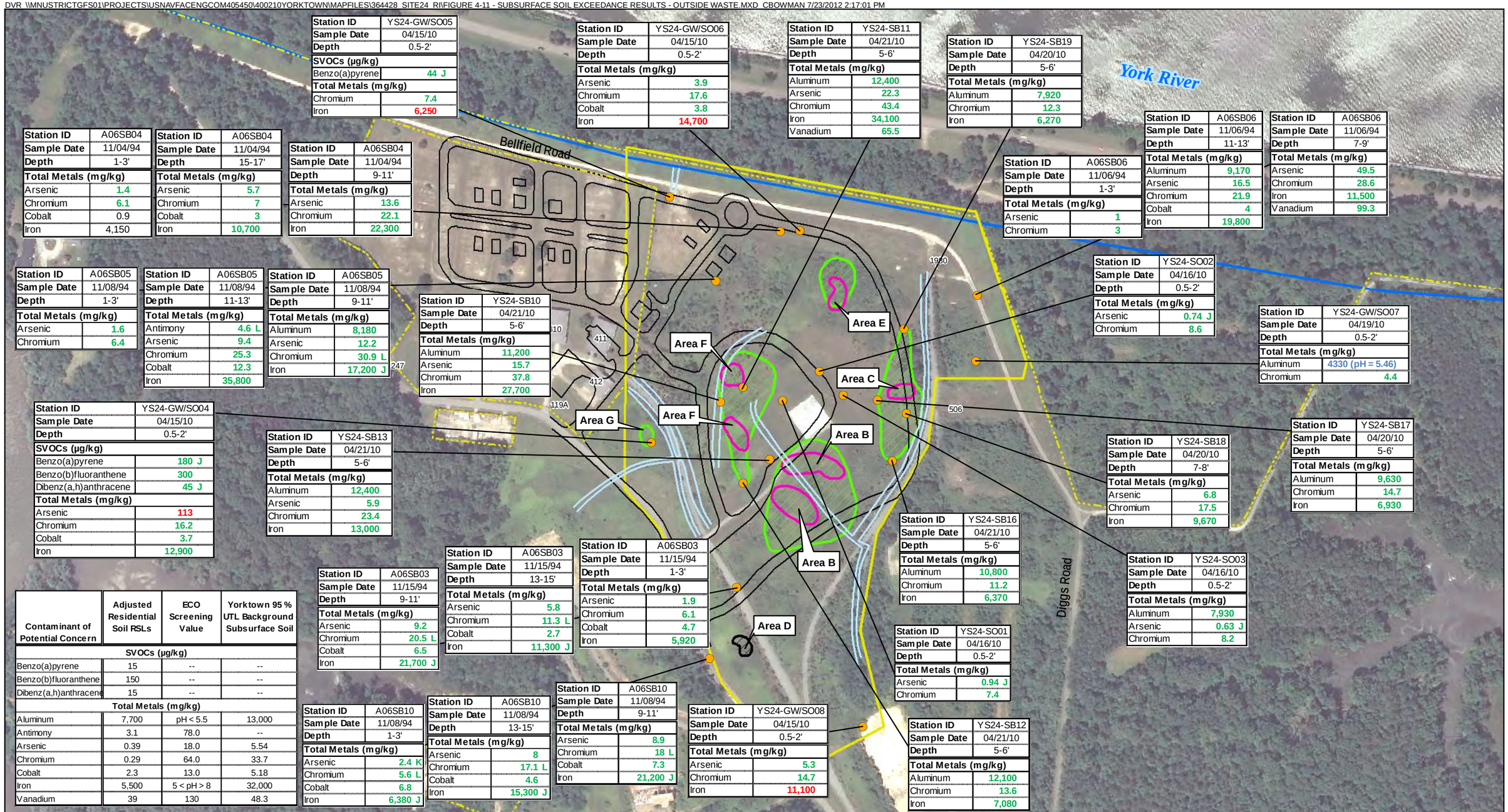
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-11 - SUBSURFACE SOIL EXCEEDANCE RESULTS - OUTSIDE WASTE.MXD CBOWMAN 7/23/2012 2:17:01 PM



Contaminant of Potential Concern	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95 % UTL Background Subsurface Soil
SVOCs (µg/kg)			
Benzo(a)pyrene	15	--	--
Benzo(b)fluoranthene	150	--	--
Dibenz(a,h)anthracene	15	--	--
Total Metals (mg/kg)			
Aluminum	7,700	pH < 5.5	13,000
Antimony	3.1	78.0	--
Arsenic	0.39	18.0	5.54
Chromium	0.29	64.0	33.7
Cobalt	2.3	13.0	5.18
Iron	5,500	5 < pH > 8	32,000
Vanadium	39	130	48.3

Legend

- Subsurface Soil Sample Locations
- JIEDDO Battle Course
- Fences
- Drainage Swales
- Magnetic Anomalies (SSP, 1994)
- Black Sludge-like Material (SSP, 1996)
- Waste Areas
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Naval Weapons Station Boundary

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text indicates exceedance of both ECO SVs and Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

N W E S

0 300 600 Feet

Figure 4-11
Subsurface Soil Exceedance Results
Outside the Estimated Buried Debris Boundary
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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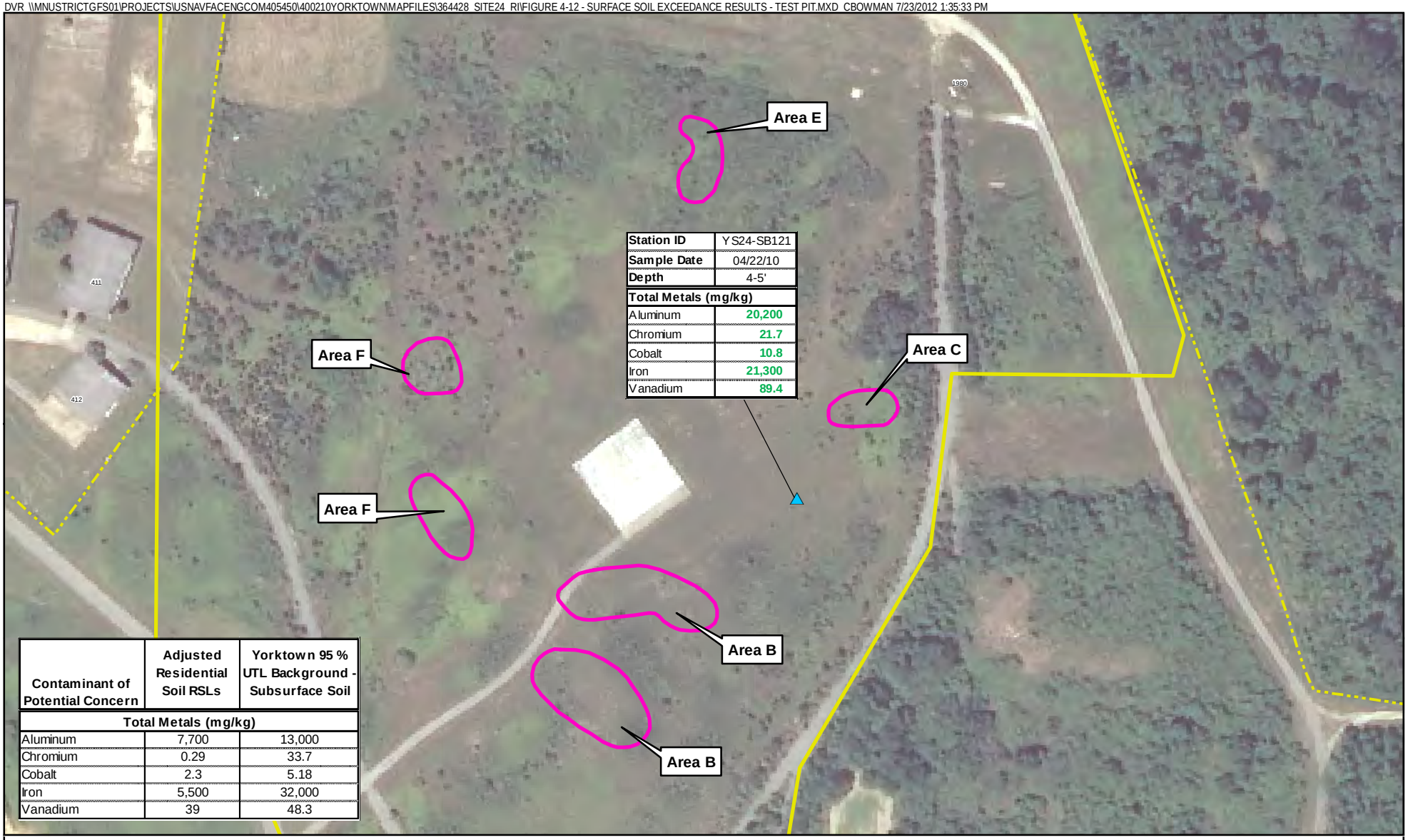
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-12 - SURFACE SOIL EXCEEDANCE RESULTS - TEST PIT.MXD CBOWMAN 7/23/2012 1:35:33 PM



Station ID	YS24-SB121
Sample Date	04/22/10
Depth	4-5'
Total Metals (mg/kg)	
Aluminum	20,200
Chromium	21.7
Cobalt	10.8
Iron	21,300
Vanadium	89.4

Contaminant of Potential Concern	Adjusted Residential Soil RSLs	Yorktown 95 % UTL Background - Subsurface Soil
Total Metals (mg/kg)		
Aluminum	7,700	13,000
Chromium	0.29	33.7
Cobalt	2.3	5.18
Iron	5,500	32,000
Vanadium	39	48.3

Legend

- Test Pit Locations (2010)
- Fences
- Waste Areas
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)

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Feet

Figure 4-12
Subsurface Soil Exceedance Results
Test Pit Subsurface Sample
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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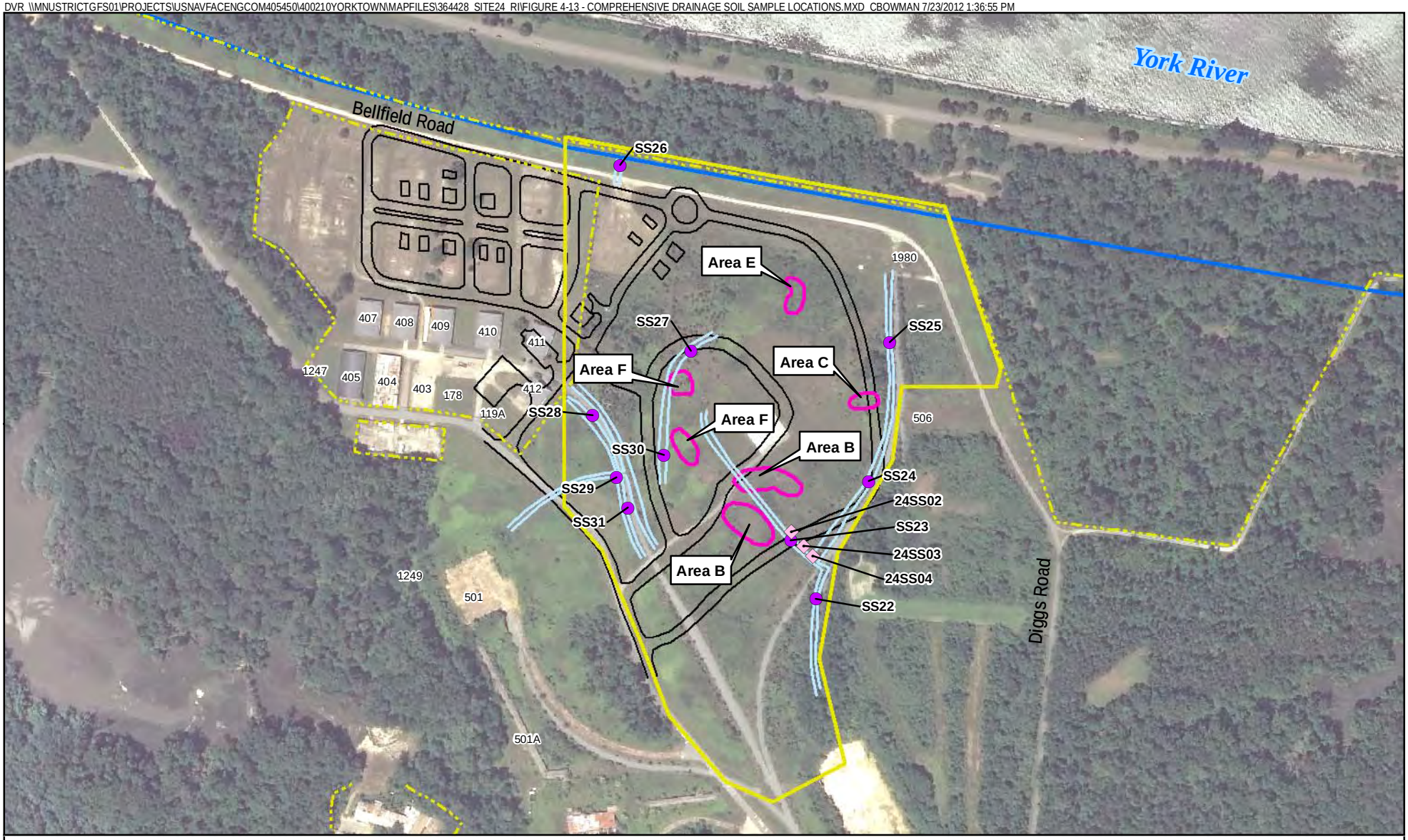
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-13 - COMPREHENSIVE DRAINAGE SOIL SAMPLE LOCATIONS.MXD CBOWMAN 7/23/2012 1:36:55 PM



Legend

- Surface Soil Sample Location (2010 RI)
- Surface Soil Sample Location (1997)
- Fences
- drainage
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- JIEDDO Battle Course
- Naval Weapons Station Boundary
- Waste Areas

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Feet

Figure 4-13
Comprehensive Drainage Soil Sample Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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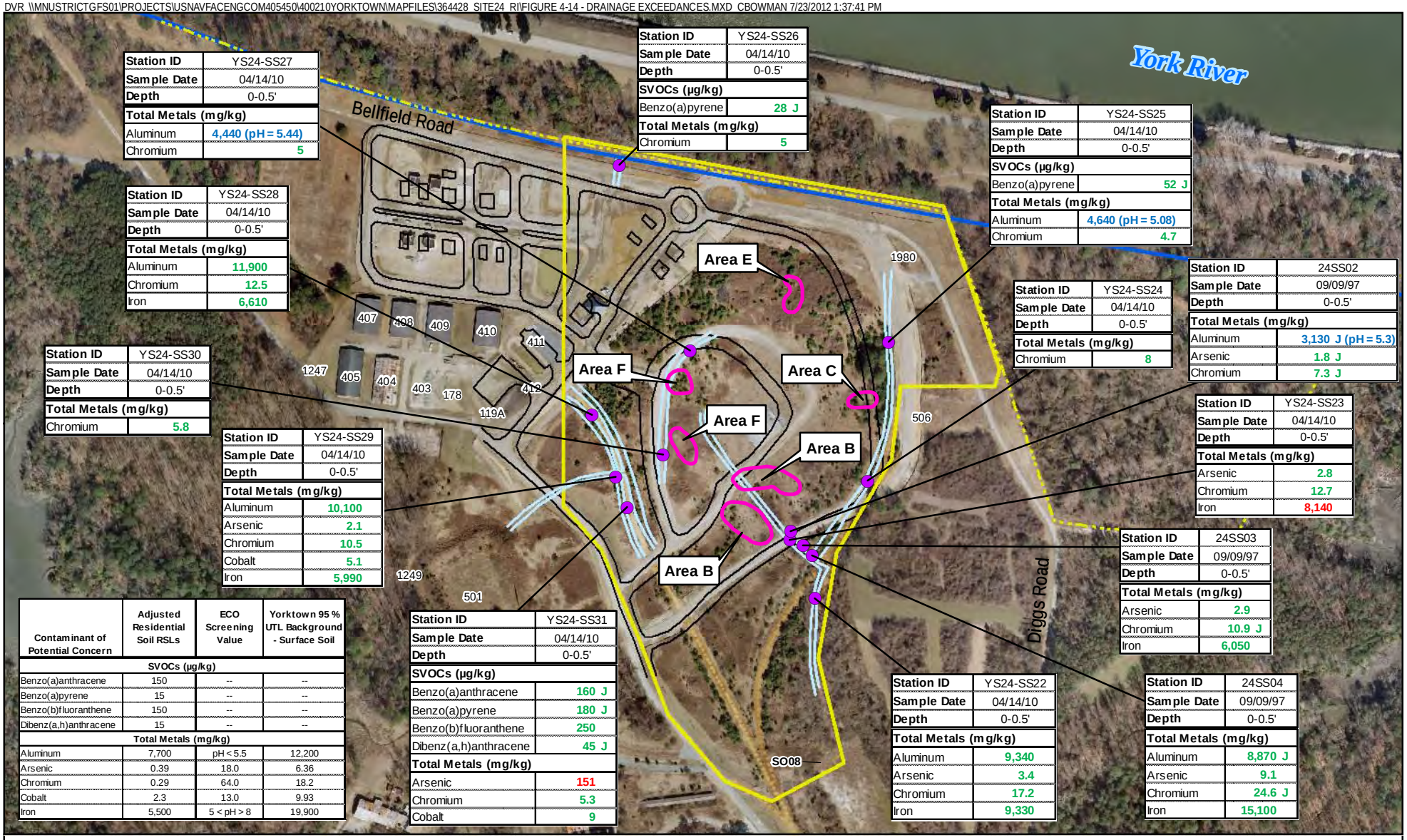
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-14 - DRAINAGE EXCEEDANCES.MXD CBOWMAN 7/23/2012 1:37:41 PM



Station ID	YS24-SS27
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	4,440 (pH = 5.44)
Chromium	5

Station ID	YS24-SS28
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	11,900
Chromium	12.5
Iron	6,610

Station ID	YS24-SS30
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	5.8

Station ID	YS24-SS29
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	10,100
Arsenic	2.1
Chromium	10.5
Cobalt	5.1
Iron	5,990

Station ID	YS24-SS26
Sample Date	04/14/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	28 J
Total Metals (mg/kg)	
Chromium	5

Station ID	YS24-SS25
Sample Date	04/14/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	52 J
Total Metals (mg/kg)	
Aluminum	4,640 (pH = 5.08)
Chromium	4.7

Station ID	YS24-SS24
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Chromium	8

Station ID	24SS02
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	3,130 J (pH = 5.3)
Arsenic	1.8 J
Chromium	7.3 J

Station ID	YS24-SS23
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.8
Chromium	12.7
Iron	8,140

Station ID	24SS03
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	2.9
Chromium	10.9 J
Iron	6,050

Station ID	YS24-SS31
Sample Date	04/14/10
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	160 J
Benzo(a)pyrene	180 J
Benzo(b)fluoranthene	250
Dibenz(a,h)anthracene	45 J
Total Metals (mg/kg)	
Arsenic	151
Chromium	5.3
Cobalt	9

Station ID	YS24-SS22
Sample Date	04/14/10
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	9,340
Arsenic	3.4
Chromium	17.2
Iron	9,330

Station ID	24SS04
Sample Date	09/09/97
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	8,870 J
Arsenic	9.1
Chromium	24.6 J
Iron	15,100

Contaminant of Potential Concern	Adjusted Residential Soil RSLs	ECO Screening Value	Yorktown 95 % UTL Background - Surface Soil
SVOCs (µg/kg)			
Benzo(a)anthracene	150	--	--
Benzo(a)pyrene	15	--	--
Benzo(b)fluoranthene	150	--	--
Dibenz(a,h)anthracene	15	--	--
Total Metals (mg/kg)			
Aluminum	7,700	pH < 5.5	12,200
Arsenic	0.39	18.0	6.36
Chromium	0.29	64.0	18.2
Cobalt	2.3	13.0	9.93
Iron	5,500	5 < pH > 8	19,900

Legend

- Yorktown Base Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Waste Areas
- JIEDDO Battle Course
- Drainage Swales
- Fences
- Surface Soil Sample Locations

Notes:

Blue text indicates exceedance of ECO SVs

Green text indicates exceedance of Adjusted Residential Soil RSLs

Red text indicates exceedance of both ECO SVs and Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

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

mg/kg - Milligrams per kilogram

N W E S

0 200 400 Feet

Figure 4-14
Drainage Soil Exceedance Results
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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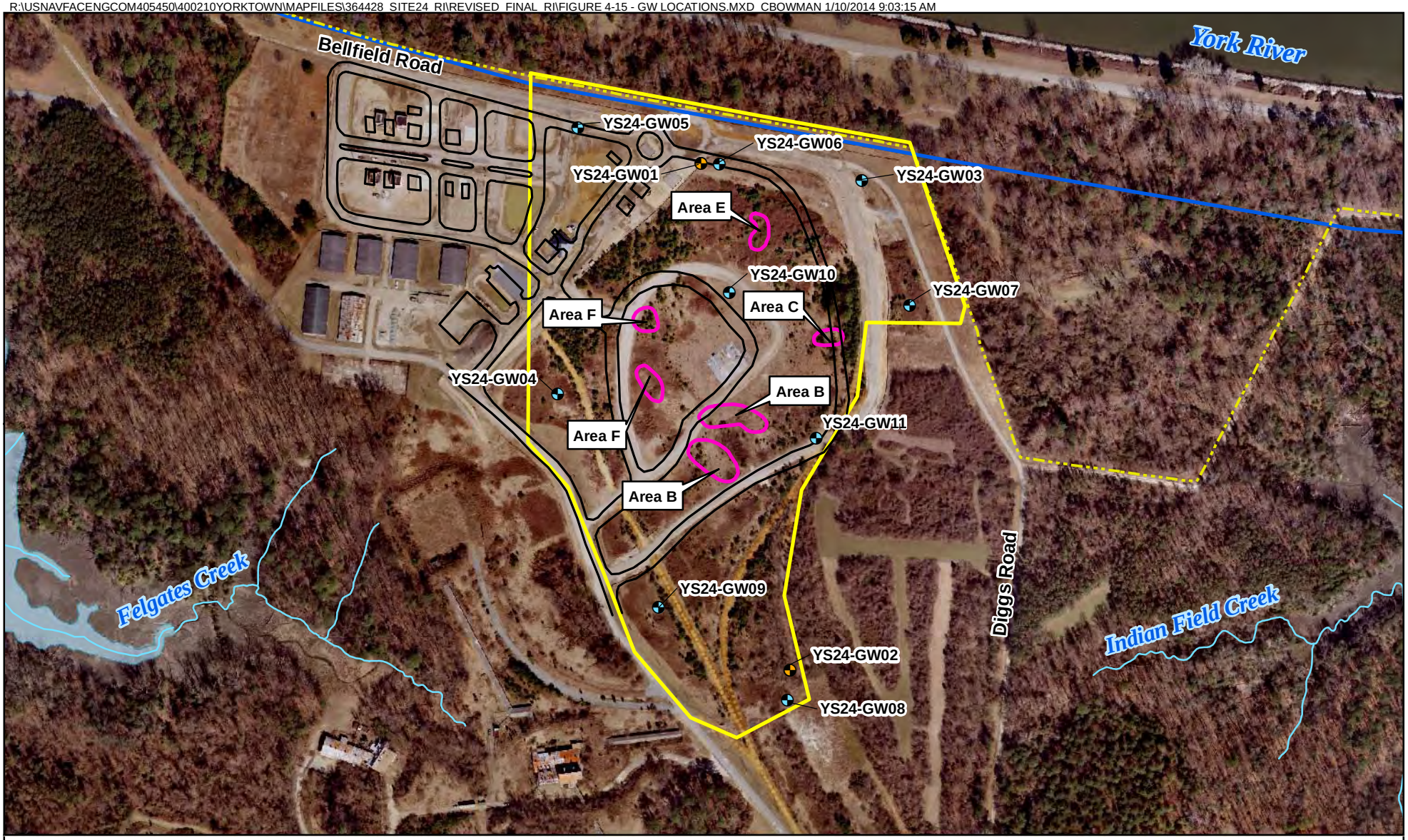
R:\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\REVISED_FINAL_RI\FIGURE 4-15 - GW LOCATIONS.MXD CBOWMAN 1/10/2014 9:03:15 AM



Legend

- Monitoring Well (Columbia Aquifer)
- Monitoring Well (Yorktown-Eastover Aquifer)
- Yorktown Base Boundary
- Site 24 Boundary
- Waste Areas
- Fences
- JIEDDO Battle Course

N
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0 200 400
Feet

Figure 4-15
Comprehensive Groundwater Sample Locations
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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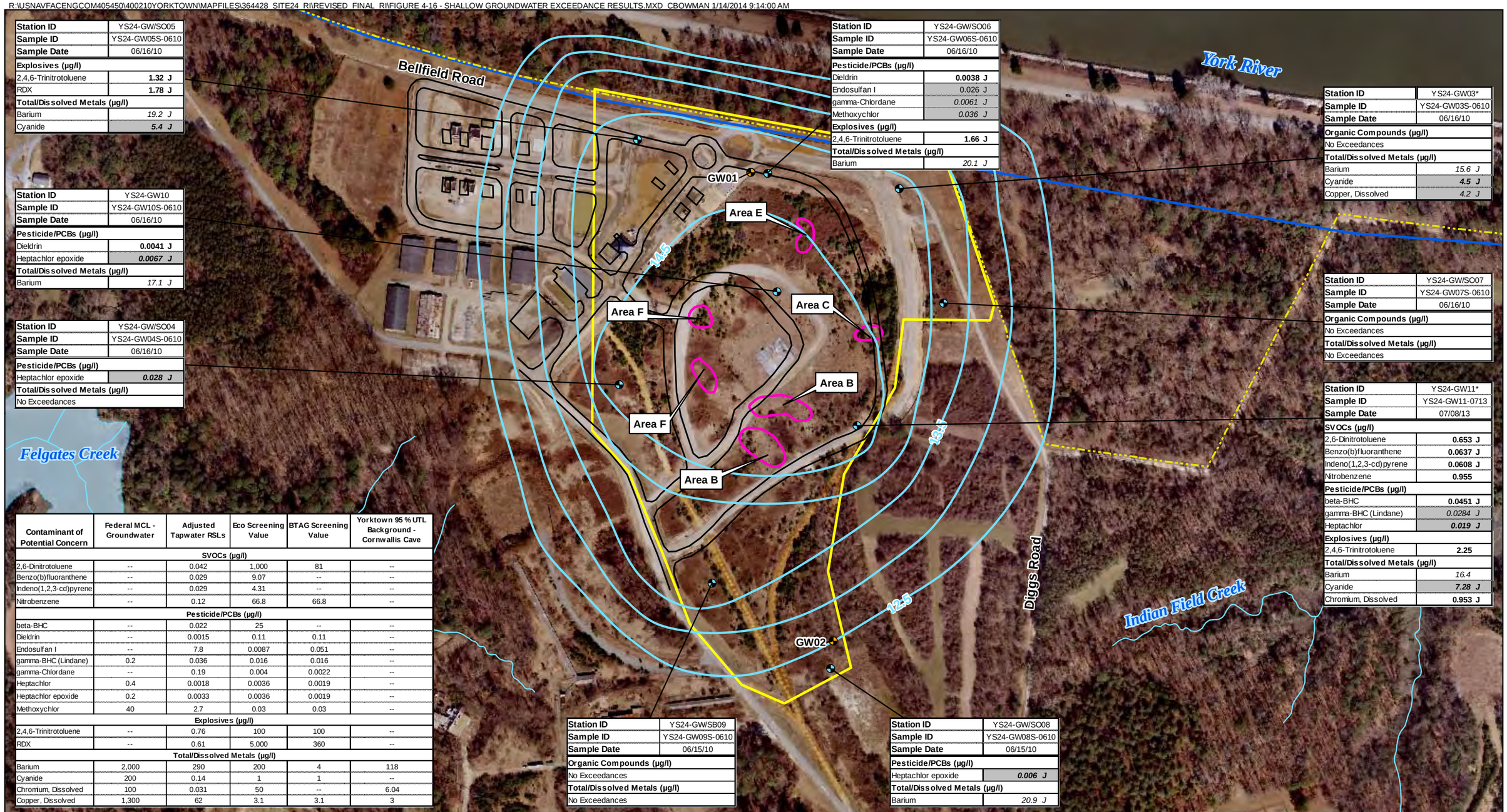
R:\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\REVISED_FINAL_RI\FIGURE 4-16 - SHALLOW GROUNDWATER EXCEEDANCE RESULTS.MXD CBOWMAN 1/14/2014 9:14:00 AM



Station ID	YS24-GW/SO05
Sample ID	YS24-GW05S-0610
Sample Date	06/16/10
Explosives (µg/l)	
2,4,6-Trinitrotoluene	**1.32 J**
RDX	**1.78 J**
Total/Dissolved Metals (µg/l)	
Barium	*19.2 J*
Cyanide	***5.4 J***

Station ID	YS24-GW10
Sample ID	YS24-GW10S-0610
Sample Date	06/16/10
Pesticide/PCBs (µg/l)	
Dieldrin	**0.0041 J**
Heptachlor epoxide	***0.0067 J***
Total/Dissolved Metals (µg/l)	
Barium	*17.1 J*

Station ID	YS24-GW/SO04
Sample ID	YS24-GW04S-0610
Sample Date	06/16/10
Pesticide/PCBs (µg/l)	
Heptachlor epoxide	***0.028 J***
Total/Dissolved Metals (µg/l)	
No Exceedances	

Station ID	YS24-GW/SO06
Sample ID	YS24-GW06S-0610
Sample Date	06/16/10
Pesticide/PCBs (µg/l)	
Dieldrin	**0.0038 J**
Endosulfan I	0.026 J
gamma-Chlordane	*0.0061 J*
Methoxychlor	*0.036 J*
Explosives (µg/l)	
2,4,6-Trinitrotoluene	**1.66 J**
Total/Dissolved Metals (µg/l)	
Barium	*20.1 J*

Station ID	YS24-GW03*
Sample ID	YS24-GW03S-0610
Sample Date	06/16/10
Organic Compounds (µg/l)	
No Exceedances	
Total/Dissolved Metals (µg/l)	
Barium	*15.6 J*
Cyanide	***4.5 J***
Copper, Dissolved	*4.2 J*

Station ID	YS24-GW/SO07
Sample ID	YS24-GW07S-0610
Sample Date	06/16/10
Organic Compounds (µg/l)	
No Exceedances	
Total/Dissolved Metals (µg/l)	
No Exceedances	

Station ID	YS24-GW11*
Sample ID	YS24-GW11-0713
Sample Date	07/08/13
SVOCs (µg/l)	
2,6-Dinitrotoluene	**0.653 J**
Benzo(b)fluoranthene	**0.0637 J**
Indeno(1,2,3-cd)pyrene	**0.0608 J**
Nitrobenzene	**0.955**
Pesticide/PCBs (µg/l)	
beta-BHC	**0.0451 J**
gamma-BHC (Lindane)	*0.0284 J*
Heptachlor	***0.019 J***
Explosives (µg/l)	
2,4,6-Trinitrotoluene	**2.25**
Total/Dissolved Metals (µg/l)	
Barium	*16.4*
Cyanide	***7.28 J***
Chromium, Dissolved	**0.953 J**

Station ID	YS24-GW/SB09
Sample ID	YS24-GW09S-0610
Sample Date	06/15/10
Organic Compounds (µg/l)	
No Exceedances	
Total/Dissolved Metals (µg/l)	
No Exceedances	

Station ID	YS24-GW/SO08
Sample ID	YS24-GW08S-0610
Sample Date	06/15/10
Pesticide/PCBs (µg/l)	
Heptachlor epoxide	***0.006 J***
Total/Dissolved Metals (µg/l)	
Barium	*20.9 J*

Contaminant of Potential Concern	Federal MCL - Groundwater	Adjusted Tapwater RSLs	Eco Screening Value	BTAG Screening Value	Yorktown 95 % UTL Background - Cornwallis Cave
SVOCs (µg/l)					
2,6-Dinitrotoluene	--	0.042	1,000	81	--
Benzo(b)fluoranthene	--	0.029	9.07	--	--
Indeno(1,2,3-cd)pyrene	--	0.029	4.31	--	--
Nitrobenzene	--	0.12	66.8	66.8	--
Pesticide/PCBs (µg/l)					
beta-BHC	--	0.022	25	--	--
Dieldrin	--	0.0015	0.11	0.11	--
Endosulfan I	--	7.8	0.0087	0.051	--
gamma-BHC (Lindane)	0.2	0.036	0.016	0.016	--
gamma-Chlordane	--	0.19	0.004	0.0022	--
Heptachlor	0.4	0.0018	0.0036	0.0019	--
Heptachlor epoxide	0.2	0.0033	0.0036	0.0019	--
Methoxychlor	40	2.7	0.03	0.03	--
Explosives (µg/l)					
2,4,6-Trinitrotoluene	--	0.76	100	100	--
RDX	--	0.61	5,000	360	--
Total/Dissolved Metals (µg/l)					
Barium	2,000	290	200	4	118
Cyanide	200	0.14	1	1	--
Chromium, Dissolved	100	0.031	50	--	6.04
Copper, Dissolved	1,300	62	3.1	3.1	3

Legend

- Monitoring Well (Yorktown-Eastover Aquifer)
- Monitoring Well (Columbia Aquifer)
- Groundwater Contour
- Fences
- JIEDDO Battle Course
- Waste Areas
- Site 24 Boundary
- Yorktown Base Boundary

Notes:
Underline indicates exceedance of the MCL
Bold text indicates exceedance of Tapwater RSLs Adjusted, May 2013
Shading indicates exceedance of the ESV
Italicized text indicates exceedance of the BTAG Value RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
µg/l - Micrograms per liter

N
W E
S

0 150 300
Feet

Figure 4-16
Shallow Groundwater Exceedance Results
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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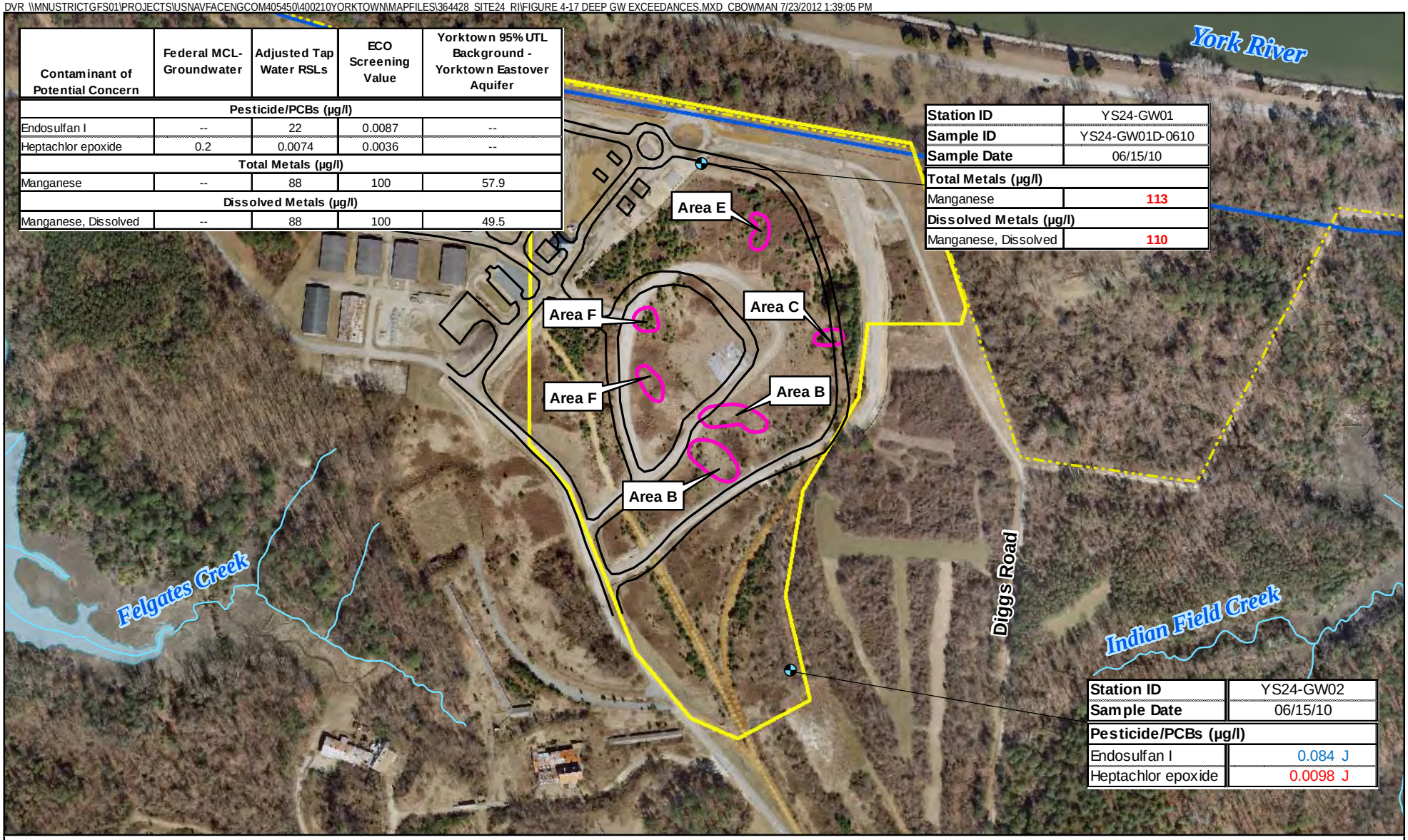
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 4-17 DEEP GW EXCEEDANCES.MXD CBOWMAN 7/23/2012 1:39:05 PM



Contaminant of Potential Concern	Federal MCL-Groundwater	Adjusted Tap Water RSLs	ECO Screening Value	Yorktown 95% UTL Background - Yorktown Eastover Aquifer
Pesticide/PCBs (µg/l)				
Endosulfan I	--	22	0.0087	--
Heptachlor epoxide	0.2	0.0074	0.0036	--
Total Metals (µg/l)				
Manganese	--	88	100	57.9
Dissolved Metals (µg/l)				
Manganese, Dissolved	--	88	100	49.5

Station ID	YS24-GW01
Sample ID	YS24-GW01D-0610
Sample Date	06/15/10
Total Metals (µg/l)	
Manganese	113
Dissolved Metals (µg/l)	
Manganese, Dissolved	110

Station ID	YS24-GW02
Sample Date	06/15/10
Pesticide/PCBs (µg/l)	
Endosulfan I	0.084 J
Heptachlor epoxide	0.0098 J

Legend
- Monitoring Well
- Yorktown Base Boundary
- Site 24 Boundary
- Waste Areas
- Fences
- JIEDDO Battle Course

Concentrations shaded in GREEN exceed RSLs
Concentrations shaded in BLUE exceed Eco Screening Values
Concentrations shaded in RED exceed RSLs and Eco Screening Values

N W E S

0 200 400 Feet

Figure 4-15
Deep Groundwater Exceedance Results
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

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SECTION 5

Chemical Fate and Transport

This section discusses the fate and transport of chemicals observed in soil and groundwater (from GW01 through GW10) at Site 24. Fate and transport consists of the identification of theoretical chemical phases and migration and degradation pathways. An understanding of the mobility and persistence of a constituent in the subsurface is part of the overall assessment of the potential for that constituent to cause an adverse human health or environmental effect.

This section also includes the CSM of the various media at Site 24 (**Figure 5-1**). The CSM qualitatively combines and interprets the information presented in this section and earlier sections of the report, including the hydrogeologic conceptual model, contaminant sources, potential migration of the contaminants, and the potential exposure and receptor pathways. The CSM is used to support potential risk management decisions and aids in defining the effectiveness of remedial alternatives, if necessary.

Chemical groups detected in environmental media at Site 24 include SVOCs, explosives, pesticides, PCBs, and inorganic constituents, as discussed in **Section 4**. To focus the fate and transport discussion on those chemical which may pose the greatest risks to human health and the environment based on their concentration and nature and extent, constituents of interest (COIs) were selected and are listed in **Table 5-1**. These representative contaminants were selected on the basis of concentrations exceeding the human health and/or environmental screening levels and background levels identified in the introduction to **Section 4** and the magnitude and frequency of contamination. In comparison, constituents of potential concern (COPCs) are identified at the beginning of the HHRA and ERA (**Sections 6** and **7**) using maximum detected concentrations and do not take into consideration threshold background values or risk management. Constituents of concern (COCs) are selected after the HHRA and ERA have been completed. The fate and transport properties for the selected COIs are described within the following subsections. Chemical properties are listed in **Table 5-2**.

5.1 Chemical Mobility and Persistence

The mobility and persistence of the potential contaminants at the site are determined by their physical, chemical, and biological interaction with the environment. Mobility is the potential for a chemical to migrate from a site, and persistence is a measure of how long a chemical will remain in the environment. Because physical and chemical properties of contaminants and the environment affect the movement of a contaminant in groundwater, predicting contaminant behavior and migration can be difficult. Some of the mechanisms controlling mobility and persistence are described as follows.

5.1.1 Solubility

Solubility is a measure of the degree to which a constituent will dissolve in water. Highly soluble chemicals are more likely to be leached from soil by precipitation or runoff that infiltrates into the subsurface. The SVOCs, pesticides, and PCBs listed in **Table 5-2** have very low solubilities (less than 0.5 mg/L), except for 2,4-DNT (solubility of 270 mg/L), n-Nitrosodi-n-propylamine (solubility of 9,890 mg/L), α-BHC (2 mg/L), and δ-BHC (10 mg/L). The two explosives of interest (2,4,6-TNT and RDX) have moderate solubilities of 130 mg/L and 38 mg/L, respectively. The solubilities of inorganic constituents are dependent on several factors and are therefore not included in **Table 5-2**. In general, solubility is highly dependent on the oxidation state of the inorganic constituent, which is dependent on subsurface conditions. The solubility of cations decreases as pH increases. Some cations may complex with oxygen and hydroxide, forming insoluble oxyhydroxides, or with phosphate, sulfate, and carbonate, forming insoluble mineral precipitates. Metal sulfide complexes, which form in reducing environments, are extremely insoluble and tend to reduce the total metals concentrations (USEPA, 1979).

5.1.2 Sorption

Sorption occurs when a constituent adheres to and becomes associated with solid particles in the geologic formation. The subsurface materials likely to sorb chemicals are clays and organic matter. Silty clay is present in the Yorktown confining unit. In addition, some inorganic constituents, such as arsenic species, can sorb to iron and oxyhydroxide or oxide coatings on soil and sediment grains.

The conventional measure of sorption is the distribution coefficient (K_d). The K_d for organic chemicals is the product of the soil organic carbon partition coefficient (K_{oc}) of the chemical and the fraction of organic carbon (f_{oc}) in the soil. Based on site-specific organic carbon data (**Tables 4-4** and **4-5**), the f_{oc} content in Site 24 soil is estimated at 0.005. In general, chemicals with a K_{oc} greater than 10,000 milliliters per gram (ml/g) have high degrees of adsorption and consequentially low mobility, whereas chemicals with a K_{oc} lower than 1,000 ml/g have lower degrees of adsorption and consequentially higher mobility. The polycyclic aromatic hydrocarbons (PAHs), pesticides, and PCBs of interest at Site 24 have high K_{oc} values, while other SVOCs (non-PAHs) and the two explosives of interest have relatively low K_{oc} values.

The K_d for inorganic chemicals is a complex function of pH, organic content, oxide coatings, and other factors; therefore, K_d is not easily estimated by methods other than site-specific testing. Due to the number of factors that impact the K_d values for inorganic constituents, these values range from 0.063 ml/g to greater than 600,000 ml/g (**Table 5-2**). Generally, inorganic adsorption increases with pH. Inorganic constituents most often sorb to clay minerals, organic matter, and iron and manganese oxyhydroxides. Inorganic constituents may be sorbed on the surface of the soil or fixed to the interior of the soil, where they are unavailable for release to groundwater. After available sorption sites are filled, most inorganic constituents are incorporated into the structures of major mineral precipitates as co-precipitates.

5.1.3 Volatilization

Volatilization occurs when a compound transfers from the aqueous phase to the gas phase. Measures of a chemical's tendency to volatilize from water and soil include its vapor pressure and Henry's Law Constant (K_h). Compounds with K_h values higher than 10^{-3} atmospheres per cubic meter per mole (atm-m^3/M) are expected to volatilize readily from water to air, whereas those with K_h values lower than 10^{-5} atm-m^3/M are relatively non-volatile. Compounds with K_h values in between these values are expected to be moderately volatile. At a given temperature, the higher the vapor pressure of a compound, the higher the volatility of that compound.

Volatilization tends to occur more readily from surface water, sediment, or shallow soil than from deeper soil or groundwater. In groundwater, volatilization can occur only at the air/water interface between the saturated and unsaturated zones, and movement of aqueous-phase contaminants from bulk groundwater to the interface is largely diffusion-limited. In unsaturated shallow soil, the soil gas pressure generally approximates the ambient air pressure. With depth, the soil gas pressure tends to increase, and it becomes more difficult for the gas to escape and equalize with the ambient air pressure.

Values of vapor pressure and K_h for the site COIs are provided in **Table 5-2**. The K_h values indicate that the PCBs of interest, and the pesticides heptachlor and α-chlordane, have properties indicative of higher volatility, while the other pesticides generally have moderate volatility. The explosives and SVOCs of interest generally have limited volatility. Due to the complexity of inorganic constituents and their variable forms in the environment, no K_h values can be provided for metals. However, these constituents are typically not volatile under normal temperature and pressure conditions. Emissions to ambient air are usually in the form of particulates. Cyanide, in the form of hydrogen cyanide or hydrocyanic acid (HCN), is highly volatile.

5.1.4 Transformation

Transformation occurs when the valence state of inorganic constituents is increased (oxidation) or decreased (reduction). It can be caused by changes in oxidation potential (E_h) and/or pH and by microbial or non-microbial (abiotic) processes. Transformation may have a significant effect on the mobility of an inorganic constituent, either increasing or decreasing it.

5.1.4.1 Aluminum, Iron, and Manganese

The solid forms of iron (iron hydroxides), aluminum (aluminum hydroxides and imogolite), and manganese (manganese oxides) are usually present in the natural soil matrix. If sufficient amounts of oxygen and nitrate are not present in the subsurface, iron hydroxides and manganese oxides will be used as electron acceptors by metabolic activity and reductively dissolved into soluble forms. Sulfides present in groundwater can also reductively dissolve iron hydroxides. The soluble form of aluminum can be released to groundwater through either complexation to organic acids or dissolution of aluminum minerals. As the pH of the subsurface decreases, the amount of soluble aluminum is generally increased.

Several inorganic constituents (such as arsenic) have a tendency to sorb to these iron and aluminum hydroxides and manganese oxides. If these compounds are reductively dissolved, then the inorganic constituents that are bound to these hydroxides and oxides will also be released.

5.1.4.2 Arsenic, Antimony, Chromium, Selenium, and Vanadium

In oxidizing environments, these constituents primarily exist as oxyanions (hard anions that contain oxygen) and are relatively mobile. They can be adsorbed by clays, iron hydroxides, aluminum hydroxides, manganese compounds, and organic material at acidic and neutral pHs.

Arsenic, chromium, and vanadium can be reduced from higher to lower valance states by organic matter, divalent inorganic constituents, and dissolved sulfide. Under reducing conditions, insoluble arsenic and antimony sulfides are precipitated in the presence of sulfides. Chromium will form insoluble chromium hydroxide or be sorbed by manganese oxides. Selenium will react with metal cations to form insoluble metal selenides.

5.1.4.3 Cadmium, Cobalt, Lead, and Zinc

These inorganic constituents form insoluble metal sulfides in anaerobic environments. They tend to sorb and will be transported in water primarily with suspended colloidal particles (ERG, 2003). The concentrations of cadmium and zinc in groundwater are usually controlled by the adsorption or co-precipitation of these metals with iron, manganese, and aluminum. However, cadmium and zinc carbonates are relatively soluble at a pH level below 8. Lead is relatively immobile in all matrices due to its strong tendency to be sorbed by iron and manganese oxides and the insolubility of many lead minerals.

5.1.4.4 Copper and Mercury

Copper and mercury are highly insoluble in reduced environments, where they precipitate as metals sulfides. They are both strongly adsorbed by organic matter, iron and manganese oxides, and clays, but complexing of these metals to ammonia, chloride, and humic acids can increase their solubility and thus mobility. Copper is insoluble above a pH of 7 to 8 and in the presence of abundant carbonate. Mercury can volatilize from soil and water, creating a cycle through the environment.

5.1.4.5 Cyanide

Cyanide can exist in aqueous solution as free cyanide [HCN or cyanide ion (CN^-)] or in complexes with metals such as cadmium, cobalt, copper, iron, nickel, and others. Iron cyanide complexes are often dominant in contaminated groundwater. They are stable in the dark at neutral-to-high pH and are highly resistant to degradation. At neutral pH conditions, iron cyanide species preferentially adsorb on aluminum oxides and kaolin clay.

5.1.5 Degradation

Degradation is the deterioration or destruction of a chemical either biologically (biodegradation) or abiotically through such processes as hydrolysis and photolysis. Biodegradation of chemicals by microbial organisms occurs through metabolic or enzymatic processes. Hydrolysis is the reaction of a chemical with water and photolysis is the result of exposing the chemical to light. The rate of degradation can be expressed as a half-life and is dependent on the existing chemical, biological, and physical conditions of the medium in which the contaminant is located.

5.1.5.1 SVOCs

The SVOCs of interest at Site 24 include PAHs, 2,4-DNT, n-nitrosodi-n-propylamine, and di-n-octylphthalate. Biodegradation of PAHs in soil has been widely reported, especially under aerobic conditions. There is also increasing evidence of anaerobic biodegradation. Nevertheless, PAHs sorbed to organic matter will be less available for biodegradation. In general, heavy PAHs (such as, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and dibenz(a,h)anthracene) are generally more recalcitrant than low molecular weight PAHs and resultantly have longer half lives. The other SVOCs (2,4-DNT, n-nitrosodi-n-propylamine, and di-n-octylphthalate) are biodegradable either aerobically or anaerobically. However, anaerobic degradation may be slower.

5.1.5.2 Explosives

Two explosives were detected at this site. 2,4,6-TNT can be aerobically biodegraded, reduced by hydrogen under anaerobic conditions, or degraded by biotic cometabolism. Some bacteria can grow on TNT as the sole nitrogen source. TNT can be also degraded abiotically by hydrolysis or reduced by iron. RDX can be biodegraded under anaerobic conditions and is subject to hydrolysis and photolysis in water.

5.1.5.3 Pesticides

The pesticides of interest at Site 24 are subject to biodegradation. Alpha-BHC and delta-BHC can biodegrade under aerobic and anaerobic conditions. However, mineralization of alpha-BHC is generally observed only in aerobic systems. Dieldrin and heptachlor are biodegradable under both aerobic and anaerobic conditions. However, biodegradation of dieldrin is typically limited. A widespread reaction for heptachlor in the environment is epoxidation to the more persistent heptachlor epoxide. Heptachlor epoxide is biodegradable by white rot fungi. The two major degradation routes for endosulfan I include biotic aerobic oxidation and abiotic hydrolysis. Chlordane requires sequential anaerobic and aerobic reactions in order for complete degradation. The anaerobic phase undergoes reductively dechlorination while the aerobic phase completes the mineralization. Biodegradation of methoxychlor favors aerobic conditions. Dieldrin and chlordane will abiotically degrade via hydrolysis and photodegradation. Similar to PAHs, the degradation of these pesticides may be limited by their availability in the soil, due to sorption to the surrounding matrix.

5.1.5.4 PCBs

Arochlor-1254 and Aroclor-1260 have historically been reported as resistant to chemical or biological degradation. Nonetheless, there is increasing evidence of aerobic biodegradation and successful phytoremediation for these highly chlorinated PCB congeners.

5.1.6 Bioaccumulation

Bioaccumulation is the extent to which a chemical will partition from water into the lipophilic parts (such as fat) of an organism. Bioaccumulation commonly is estimated by the octanol-water partition coefficient (K_{ow}). Chemicals with high values of K_{ow} tend to avoid the aqueous phase and remain in soil longer or bioaccumulate in the lipid tissue of exposed organisms. Accumulation of a chemical in the tissue of the organism can be quantified by a bioconcentration factor (BCF), which is the ratio of the concentration of the chemical in the tissue to the concentration in the water. BCFs are both contaminant-specific and species-specific.

Table 5-2 lists some bioaccumulation values for the COIs. The PCBs, heptachlor, and heptachlor epoxide had the highest values of K_{ow}, which indicates a higher potential to bioaccumulate. It is assumed that for a metal to be taken up by a plant or to exert an effect on plant growth, it must be present in solution. Therefore, factors that influence the speciation and solubility of inorganic constituents in soils also affect bioconcentration. The pH of soils can also affect the amount of plant uptake of certain elements.

5.1.7 Geochemical Evaluation

As discussed in **Sections 5.1.4** and **5.1.5**, the geochemical conditions of the subsurface can impact the speciation of inorganic constituents and degradation of organic constituents. COIs in groundwater at Site 24 include RDX, pesticides (endosulfan I, gamma-chlordane, heptachlor epoxide, and methoxychlor), copper, and cyanide. In the deeper Yorktown-Eastover aquifer, only pesticides were reported at concentrations exceeding their respective

screening criteria. This section provides a summary of geochemical conditions in site groundwater based on the data provided in **Tables 4-6** and **4-8**.

In the shallow Columbia aquifer, groundwater is under aerobic and more-oxidizing conditions, with DO concentrations ranging from 3 to 8 mg/L and ORP values typically greater than 130 mV. Due to the proximity of Site 24 to several surface water bodies, shallow groundwater flows radially outward from monitoring well YS24-GW10, which is located in the center of the site. Therefore, there is no upgradient monitoring well which can provide background data for comparison purposes and help identify footprints of oxidation-reduction reactions. During the RI, nitrate was detected at low levels (less than 1 mg/L) across the site, while nitrite was not detected, indicating that nitrate reduction is not a significant process at the site. Sulfate was detected between 13.8 and 19.8 mg/L, while sulfide was not detected; however, dissolved sulfide quickly complexes and is frequently not detected in groundwater. pH values in the shallow aquifer were neutral. These aerobic conditions are favorable for biodegradation of methoxychlor. Cyanide may also degrade. However, RDX and other pesticides may be persistent. Additionally, very low TOC concentrations (1.1 mg/L or less) in groundwater may be a limiting rate factor for those constituents requiring a carbon (electron donor) source for biodegradation. Copper will likely be found in its more soluble form.

Groundwater in the deeper Yorktown-Eastover aquifer is less aerobic and more reduced. DO concentrations ranged from 0 to 3.38 mg/L, and ORP values ranged from 29 to -129 mV. Under these conditions, endosulfan I and heptachlor epoxide may be resistant to biodegradation, and physical natural attenuation processes may be the controlling factors in contaminant fate and transport.

5.2 Contaminant Migration

This subsection discusses the site-specific sources and potential mechanisms for contaminant release and migration from these sources. **Figure 5-1,** the Site 24 CSM, supports the discussion in this section.

5.2.1 Potential Sources of Contamination

Based on investigations conducted at Site 24, source releases from the following areas may have impacted soil and groundwater:

- Six buried debris areas within magnetic anomaly Areas B, C, E, and F containing various materials, including inert ordnance debris, rocket motor casings, parachutes, corroded drums, and miscellaneous metal and construction debris
- Minor disposal activities at Area G
- Surface and underground munitions storage prior to World War II
- Historical ground storage in the northwestern portion of the site
- Burning of explosives in the vicinity of the helicopter landing-pad

Based on chemical data collected at Site 24, it is unlikely that the small area with black sludge-like material on the ground surface (Area D) was a significant source of contamination. There were no constituents detected in surface or subsurface soil samples at concentrations exceeding their respective screening criteria and/or their respective background 95 percent UTLs (see **Sections 4.2.1.3** and **4.2.2.3**). Based on the distribution of pesticides in site soil, they may have been applied around the buried waste areas or gravel roads as part of routine pest management.

5.2.2 Migration from Potential Source Areas

The following subsections present a generalized description of theoretical contaminant flow pathways at Site 24 that may have resulted in the distribution of contaminants. Potential exposure and receptor pathways are discussed in **Sections 6** and **7**.

5.2.2.1 Unsaturated Zone Migration

Contaminants released to surface soil (via direct waste placement, surface storage, or burning) may have migrated vertically through the unsaturated zone through gravitational force or leaching from infiltration. Buried

debris was also placed directly in subsurface soil between 2 and 13 feet bgs. Site 24 is predominantly grass covered with gravel roads, providing little to no restriction for infiltration. Where vegetation or gravel is absent, site contaminants in surface soil could also be released to the atmosphere via wind erosion; however, since the site is almost completely covered by grass and gravel, to a lesser extent, this is not considered a migration pathway. The pesticide alpha-chlordane may volatilize into the atmosphere. There are no buildings onsite currently; therefore, vapor intrusion into indoor air is not a complete pathway. The other COIs in surface soil are considered to have low volatility. Once in the unsaturated zone, contaminants may have sorbed to soil or organic matter, become trapped in residual pore space, or continued to leach to the saturated zone.

At Site 24, PAHs were detected above screening values across the site. These constituents would be expected to adsorb to soil and not appreciably leach to groundwater. Although benzo(a)pyrene was detected in several surface soil samples, it was only detected in two subsurface soil samples above screening levels, which is evidence of limited vertical migration. The highest concentration of PAHs was detected from subsurface soil collected at minor disposal Area G. Based on the depth of the subsurface soil sample and the reported PAH concentrations in the surface soil sample from this area, the presence of PAHs in the subsurface is likely due to a release from buried debris rather than leaching from the surface.

The SVOC 2,4-DNT and the explosive 2,4,6-DNT were detected in subsurface soil from the buried debris in magnetic anomaly Area F. These constituents could potentially leach into groundwater; however, there were no exceedances by these compounds in groundwater. 2,4-DNT is also a potential degradation product of TNT. Due to the absence of these constituents in surface soil, their presence in the subsurface is attributed to disposal activities rather than leaching.

PCBs were only detected above screening criteria from soil samples collected within the buried debris of magnetic anomaly Area B. Similar to PAHs, Arochlor-1254 and Aroclor-1260 are expected to sorb to soil and not appreciably leach to groundwater. Based on their moderate volatility, they may evaporate into soil gas and then into the atmosphere. Due to the depth of the disposal activities (up to 13 feet bgs), concentrations are two orders of magnitude higher in subsurface soil than in surface soil. The highest concentrations were observed in the deepest soil sample (9 to 10 feet bgs).

Pesticides and the SVOC n-nitroso-di-n-propylamine were also detected above screening criteria in soil from magnetic anomaly Area B. n-Nitroso-di-n-propylamine has a high mobility in soil; however, it was not detected in groundwater. alpha-BHC has moderate mobility in soil, while heptachlor and dieldrin would be expected to preferentially sorb to soil. None of these pesticides were in exceedance of their screening levels in groundwater.

Two pesticides (alpha-chlordane and gamma-chlordane) were detected above screening levels in surface soil at magnetic anomaly Area E outside of the buried debris. Both of these pesticides would be expected to preferentially sorb to soil. However, the presence of gamma-chlordane above its screening levels in one shallow aquifer monitoring well, located directly west of Area E, is indicative of vertical migration.

Numerous inorganic constituents were detected in soil at Site 24 above applicable screening levels. However, as stated in **Section 4**, several inorganic constituents (such as arsenic, chromium, cobalt, and iron in surface and subsurface soil and aluminum and selenium in surface soil) may be naturally occurring, and their reported presence may or may not indicate a contaminant release. In surface soil, the highest concentrations of inorganic constituents were detected in the buried debris at magnetic anomaly Area B. In subsurface soil, the highest concentrations inside of the buried debris were at magnetic anomaly Area E. Elevated arsenic concentrations were also observed in surface and subsurface soil at Area G.

The mobility of inorganic constituents in the unsaturated zone is highly dependent on the subsurface conditions. Since the highest concentrations of inorganic constituents were found within the magnetic anomaly and disposal areas, which were observed to be up to a depth of 13 feet bgs, the distribution of concentrations in the subsurface are not helpful at determining whether migration or leaching has occurred. Only copper and manganese were detected above screening levels in groundwater. Since soil at Site 24 is assumed to exist under oxidizing conditions, aluminum and manganese will tend to be in their less soluble forms of aluminum hydroxides and imogolite and manganese oxides. In oxidizing environments, arsenic, antimony, chromium, and vanadium are typically present in

more mobile forms. However, these inorganic constituents, along with cadmium, cobalt, copper, lead, and mercury, will potentially sorb or complex with either clays, organic material, or iron hydroxides and manganese oxides, limiting their mobility. However, cadmium carbonates are relatively mobile under neutral pH, and copper and mercury are more mobile under oxidizing conditions.

5.2.2.2 Surface Water Runoff

Several drainage swales are located within Site 24. Although the soil within these swales is typically dry, during stormwater events, surface runoff flows into the drainage swales as directed by site topography. Runoff may be limited by the grass surface-cover in some areas. The runoff may transport surface soil contaminants from the release areas into the drainage swales, which are later deposited as surface soil. Due to the intermittent nature of surface water at the site, the dissolution of contaminants from surface soil into surface water and then the subsequent infiltration of these dissolved contaminants into the subsurface is not considered a significant pathway.

In drainage area surface soil, PAHs and inorganic constituents were detected above applicable screening levels. In general, PAHs are more likely to sorb to soil or organic matter than to partition significantly to water. The highest concentrations of PAHs were detected in a sample located downslope of minor disposal Area G, which also had PAH exceedances. This indicates some transport may have occurred in this area. Benzo(a)pyrene was also detected in two other drainage samples. However, due to the widespread distribution of this constituent in surface soil, its presence may be unrelated to surface water deposition. Arsenic was the only inorganic constituent detected above its background level in a sample located downstream of magnetic anomaly Area B. Arsenic concentrations in the drainage area sample were slightly higher than those observed in Area B, which were similar to background levels.

5.2.2.3 Saturated Zone Migration

Contaminants in the Columbia aquifer have been transported from the source release areas through advection and dispersion. Advection is the primary transport mechanism and includes the transport of dissolved contaminants by the bulk motion of flowing groundwater. Dispersion is the spreading of dissolved contaminants from the path they would be expected to follow during advection due to the spatial variation in aquifer permeability, fluid mixing, and molecular diffusion. At Site 24, groundwater in the Columbia aquifer horizontally flows from the center of the site to the north towards the York River, to the southwest towards Felgates Creek, and to the southeast towards Indian Field Creek.

Contaminants typically will not move as rapidly as groundwater because of retardation or the adsorption of the contaminant to the solid media. At Site 24, TOC content in the soil is relatively low. The shallow aquifer is comprised of a combination of silts, clays, sands, and gravels; clay content is frequently higher near the bottom of the aquifer where it transitions to the Yorktown confining unit. Therefore, retardation can be a significant factor for several of the COIs. The advective migration rates of different dissolved contaminants vary depending on the K_d and the rate of groundwater flow. For each contaminant detected at the site, it is theoretically possible to calculate a retardation coefficient, which is an estimate of the degree to which the contaminant is slowed by adsorption in relation to the groundwater flow velocity. The retardation coefficient is calculated according to the following equation:

$$R = 1 + p_b \times K_d/n_e$$

Where :

R = Retardation coefficient (dimensionless)
p_b = Bulk density (grams per cubic centimeter [g/cm^3])
K_d = Distribution coefficient (ml/g)
n_e = effective porosity (dimensionless)

Assuming a bulk density of 1.3 g/cm^3 and an effective porosity of 0.3, the estimated retardation coefficients are listed in **Table 5-2**. The retardation coefficients for the representative PAHs and PCBs ranged from 8,800 to 122,000. Retardation coefficients for representative pesticides ranged from 45 to 5,440, and the retardation

coefficients for the remaining SVOCs and explosives were less than 7.The retardation of inorganic constituents is variable depending on the form of the chemical in the subsurface and may range from 1.4 to greater than 4,000,000. The effect of retardation is estimated by dividing the groundwater flow velocity by R, which provides a value of migration that is either equal to (in the case of no retardation) or less than (in the presence of retardation) the groundwater flow velocity (**Table 5-2**). Based on the information presented in **Section 3.5**, the average groundwater flow velocity was estimated at 0.081 ft/day.

In the shallow aquifer, pesticides, explosives, and inorganic constituents were detected above screening values. Pesticides (heptachlor epoxide, endosulfan I, and gamma-chlordane) were observed across the entire site, occurring primarily as isolated detections. Based on this distribution and the fact that pesticides are not highly mobile in groundwater, the extent of these constituents is attributed to the wide distribution of these constituents in soil. The low concentrations (less than 0.04 μg/L) of pesticides in groundwater suggests that their migration has been limited by sorption to the soil matrices. An evaluation of the 1994 SSP pesticide concentrations in hydropunch samples, downgradient of the source areas, confirms the limited mobility of pesticides from these areas. The explosive RDX occurs as an isolated detection in the northwestern corner of the site. Because it was not detected in soil, there does not appear to be a continuing source. RDX is expected to be highly mobile.

Transport and partitioning of inorganic constituents in groundwater is dependent on the oxidation state of the inorganic constituent and on interactions with other materials present. The only inorganic constituents detected above screening levels in shallow groundwater were cyanide and copper. The cyanide plume is limited to the northern portion of the site, while the copper plume is limited to the northeastern portion of the site. These plume locations are consistent with the locations of elevated concentrations of both these constituents in soil. Cyanide can have a high mobility in groundwater if present as a salt. It can also potentially volatilize to soil gas at the water table interface. Copper is considered to be in a more soluble, or mobile, form under oxidizing conditions. However, it is also strongly adsorbed by organic matter, iron and manganese oxides, and clays.

Contaminants in the shallow Columbia aquifer can also vertically migrate to the deeper Yorktown-Eastover aquifer; the Yorktown confining unit, which primarily consists of silty sands and clays, limits migration. Within Site 24, the confining unit is thinner than other locations at WPNSTA Yorktown and does not appear as impermeable. Nevertheless, the confining unit does minimize vertical transport and as a result, few COIs were detected in deep groundwater. The SVOCs di-n-octylphthalate and manganese were detected in the northern well YS24-GW01. This SVOC has moderate mobility in groundwater and may degrade slower under anaerobic conditions. The manganese levels may be elevated due to the more reducing conditions observed in the deeper aquifer rather than from site activities. Pesticides were detected in the southern well YS24-GW02 at very low levels (less than 0.09 μg/L). Heptachlor epoxide and endosulfan I are two of the more mobile pesticides detected at the site, which may account for their presence in deeper groundwater. Nevertheless, they are expected to have limited mobility in groundwater.

5.2.3 Summary of Current Migration Pathways

Based on the fate and transport mechanisms active at Site 24, the primary migration pathways of representative contaminants in the site media are:

- Surface water runoff of contaminants in surface soil from source areas and deposition within drainage swales
- Leaching of contaminants from buried debris and surface soil into subsurface soil and subsequently into groundwater
- Dissolved contaminant migration horizontally in the shallow Columbia aquifer with groundwater flow
- Dissolved contaminant migration vertically to the deeper Yorktown-Eastover aquifer with groundwater flow

A less prominent fate and transport mechanism of representative contaminants present at Site 24 is volatilization of surface soil contaminants into the atmosphere.

TABLE 5-1

Constituents of Interest by Medium

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Constituents of Interest (COIs)	Surface Soil within Waste Boundary	Surface Soil outside Waste Boundary	Subsurface Soil within Waste Boundary		Subsurface Soil outside Waste Boundary		Drainage Soil	Sludge Area	Groundwater	
			Soil Debris	Subsurface Soil	Shallow and Deep Subsurface Soil	Test Pit Subsurface Soil			Shallow	Deep
Semi-Volatile Organic Compounds										
Benzo(a)pyrene	X	X			X		X			
benzo(a)anthracene							X			
benzo(b)fluoranthene					X		X			
dibenz(a,h)anthracene					X		X			
2,4-Dinitrotoluene				X						
di-n-octylphthalate										X
n-Nitrosodi-n-propylamine				X						
Explosives										
2,4,6-Trinitrotoluene				X						
RDX									X	
Pesticides										
alpha-BHC				X						
alpha-Chlordane		X								
Dieldrin				X						
Endosulfan I									X	X
gamma-Chlordane		X							X	
Heptachlor				X						
Heptachlor epoxide									X	X
Methoxychlor									X	
PCBs										
Aroclor-1254	X		X	X						
Aroclor-1260			X	X						

TABLE 5-1

Constituents of Interest by Medium

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Constituents of Interest (COIs)	Surface Soil within Waste Boundary	Surface Soil outside Waste Boundary	Subsurface Soil within Waste Boundary		Subsurface Soil outside Waste Boundary		Drainage Soil	Sludge Area	Groundwater	
			Soil Debris	Subsurface Soil	Shallow and Deep Subsurface Soil	Test Pit Subsurface Soil			Shallow	Deep
Inorganics										
Aluminum	X	X	X	X	X	X	X			
Antimony					X					
Arsenic	X	X	X	X	X		X			
Cadmium	X		X	X						
Chromium	X	X	X	X	X	X	X	X		
Cobalt	X	X	X	X	X	X	X	X		
Copper	X	X	X						X	
Cyanide									X	
Iron	X	X	X	X	X	X	X			
Lead	X									X
Manganese		X	X					X		
Mercury	X	X								
Selenium	X	X								
Vanadium					X	X				
Zinc	X									

TABLE 5-2

Physical and Chemical Data of Constituents of Interest

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Constituents of Interest	CAS #	Molecular Weight (g/mole)	Density (g/cm^3)	Water Solubility (mg/L)	Vapor Pressure (mm Hg)	K_h (atm-m3/mole)	Log K_{oc} (---)	K_d (mL/g)	R (---)	V_c (ft/day)	Log K_{ow} (---)	Log BCF (---)
Semi-Volatile Organic Compounds												
Benzo(a)pyrene	50-32-8	252.32	1.35	0.0016	5.49E-09	3.36E-07	5.95	4,456	19,300	6.2E-06	6.00	3.69
Benzo(a)anthracene	56-55-3	228.30	1.27	0.0094	2.10E-07	8.00E-06	5.81	3,228	14,000	8.6E-06	5.61	4.00
Benzo(b)fluoranthene	205-99-2	252.36	NA	0.0012	5.00E-07	7.39E-07	6.60	19,905	86,000	1.4E-06	6.00	4.00
Dibenz(a,h)anthracene	53-70-3	278.33	1.28	0.0005	9.55E-10	7.30E-08	6.75	28,117	122,000	9.8E-07	6.50	4.00
Di-n-octylphthalate	117-84-0	390.56	0.978	0.20	1.44E-04	5.50E-06	4.28	95	0	#DIV/0!	5.22	2.64
2,4-Dinitrotoluene	121-14-2	182.14	1.32	270	1.10E-04	8.79E-08	2.45	1.41	7.1	1.7E-02	1.98	NA
n-Nitroso-n-propylamine	621-64-7	130.19	0.93	9,894	8.6E-02	1.47E-06	2.11	0.64	3.8	3.2E-02	1.36	NA
Explosives												
2,4,6-Trinitrotoluene	118-96-7	227.13	1.65	130	1.99E-04	4.57E-07	2.48	1.51	7.5	1.6E-02	1.60	NA
RDX	121-82-4	222.26	1.82	38	1.00E-09	2.00E-11	1.80	0.32	2.4	5.1E-02	0.87	NA
Pesticides												
alpha-BHC	319-84-6	290.83	1.87	2	4.50E-05	6.86E-06	3.57	18.58	81	1.5E-03	3.80	NA
delta-BHC	319-86-8	290.83	no data	10	3.50E-05	2.10E-07	3.80	31.55	138	8.7E-04	4.14	3.25
alpha-Chlordane	5103-71-9	409.8	NA	0.051	3.60E-05	8.75E-04	5.40	1,256	5,440	2.2E-05	5.93	3.68
Dieldrin	60-57-1	380.9	1.75	0.186	3.99E-05	5.80E-05	4.37	117.2	509	2.4E-04	5.16	2.95
Endosulfan I	959-98-8	406.92	1.745	0.32	4.58E-05	6.55E-05	3.31	10.2	45	2.7E-03	3.55	3.44
gamma-Chlordane	5103-74-2	409.8	1.59	0.009	1.00E-05	4.8E-05	4.88	379.3	1,640	7.3E-05	6.0	3.74
Heptachlor	76-44-8	373.32	1.66	0.18	3.00E-04	2.3E-03	4.38	119.94	521	2.3E-04	5.5	4.14
Heptachlor epoxide	1024-57-3	389.32	1.57	0.2	3.00E-04	3.2E-05	4.32	104.46	454	2.6E-04	5.40	4.16
Methoxychlor	72-43-5	345.66	1.41	0.1	NA	1.58E-05	4.9	397.16	1,720	7.0E-05	4.68	NA
PCBs												
Aroclor-1254	11097-69-1	327	1.51	0.050	7.71E-05	1.90E-04	5.61	2,037	8,800	1.4E-05	6.5	4.7
Aroclor-1260	11096-82-5	370	1.57	0.08	4.05E-05	4.60E-03	6.42	13,151	57,000	2.1E-06	6.8	5.29
Metals												
Aluminum	7429-90-5	26.98	2.70	U	U	U	NA	NA	NA	NA	U	U
Antimony	7440-36-0	121.75	6.68	U	U	U	NA	1.3 - 500	9.5 - 3,300	2.4E-04 - 0.013	U	U
Arsenic	7440-38-2	74.92	5.78	U	U	U	NA	2.0 - 20,000	14 - 130,00	6.0E-06 - 0.009	U	U
Cadmium	7440-43-9	112.41	8.65	U	U	U	NA	1.3 - 100,000	9.5 - 650,000	1.2E-06 - 0.013	U	U
Chromium	16065-83-1 & 18540-29-9	52.00	7.14	U	U	U	NA	0.20 - 63,000	2.3 - 409,500	1.9E-06 - 0.052	U	U
Cobalt	7440-48-4	59.00	8.90	U	U	U	NA	0.063 - 12,600	1.4 - 81,900	9.5E-06 - 0.085	U	U
Copper	7440-50-8	63.55	8.94	U	U	U	NA	1.6 - 4,000	11 - 26,000	3.0E-05 - 0.011	U	U
Cyanide	74-90-8	26	0.69	completely miscible	610	0.012	NA	5.0 - 4,000 (3)	34 - 26,000	3.0E-05 - 0.004	U	U
Iron	7439-89-6	55.85	7.87	U	U	U	NA	1.4 - 10,000	10 - 65,900	1.2E-05 - 0.012	U	U
Lead	7439-92-1	207.20	11.34	U	U	U	NA	5.0 - 100,000	34 - 650,000	1.2E-06 - 0.004	U	U
Manganese	7439-96-5	54.94	7.26	U	U	U	NA	NA	NA	NA	U	U
Mercury	7439-97-6	200.59	13.53	U	U	U	NA	160 - 630,000 (3)	1,040 - 4,095,000	1.9E-07 - 1.2E-04	U	U
Selenium	7782-49-2	78.96	4.39	U	U	U	NA	0.5 - 250	4.3 - 1,600	4.8E-04 - 0.028	U	U

TABLE 5-2

Physical and Chemical Data of Constituents of Interest

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Constituents of Interest	CAS #	Molecular Weight (g/mole)	Density (g/cm^3)	Water Solubility (mg/L)	Vapor Pressure (mm Hg)	K_h (atm-m3/mole)	Log K_{oc} (---)	K_d (mL/g)	R (---)	V_c (ft/day)	Log K_{ow} (---)	Log BCF (---)
Vanadium	7440-62-2	50.94	6.11	U	U	U	NA	4.0 - 500	27 - 3,300	2.4E-04 - 0.004	U	U
Zinc	7440-66-6	65.39	7.13	U	U	U	NA	0.1 - 100,000	1.7 - 650,000	1.2E-06 - 0.073	U	U

Note: Vapor pressure listed for mercury is in the form of hydrogen mercury.

BCF = Bioconcentration Factor

foc = fraction organic carbon = 0.0025 (assumed)

K_d = Soil-Water partition coefficient = K_{oc} x foc for organics

K_h= Henry's Law Constant

K_{oc} = Organic carbon partition coefficient

K_{ow} = Octanol-water partition coefficient

NA = no information available

n_e = Effective porosity = 0.3

R = Retardation coefficient = $1 + K_d \times p_b / n_e$

p_b = Soil bulk density = 1.3 grams per cubic centimeter (sandy clay)

U = No value is provided because of the uncertainty in the form of these chemicals in the environment.

Vc = Contaminant velocity = seepage velocity (estimated at 0.12 ft/day) / R

Data sources (Source 4 is primary reference):

(1) Agency of Toxic Substances and Disease Registry. 2005 and 2009. Toxicological Profiles. *http://www.atsdr.cdc.gov/toxprofiles/index.asp*

(2) Dragun, James. 1998. *The Soil Chemistry of Hazardous Materials 2nd Edition*.

(3) Interstate Technology and Regulatory Council. 2002. *A Systematic Approach to In Situ Bioremediation in Groundwater Including Decision Trees on In Situ Bioremediation for Nitrates, Carbon Tetrachloride, and Perchlorate.* In Situ Bioremediation Team.

(4) Montgomery. 2000. *Groundwater Chemicals Desk Reference. Third Edition.*

(5) SRC. 2009. Interactive PhysProp Database Demo. *http://www.srcinc.com/what-we-do/databaseforms.aspx?id=386*

(6) United States Environmental Protection Agency. 1999. *Partition Coefficients for Metals in Surface Water, Soil, and Waste.*

(7) United States National Library of Medicine. 2011. Hazardous Substances Data Bank (HSDB). *http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB*

(8) IPCS. 2010. *http://www.inchem.org/*

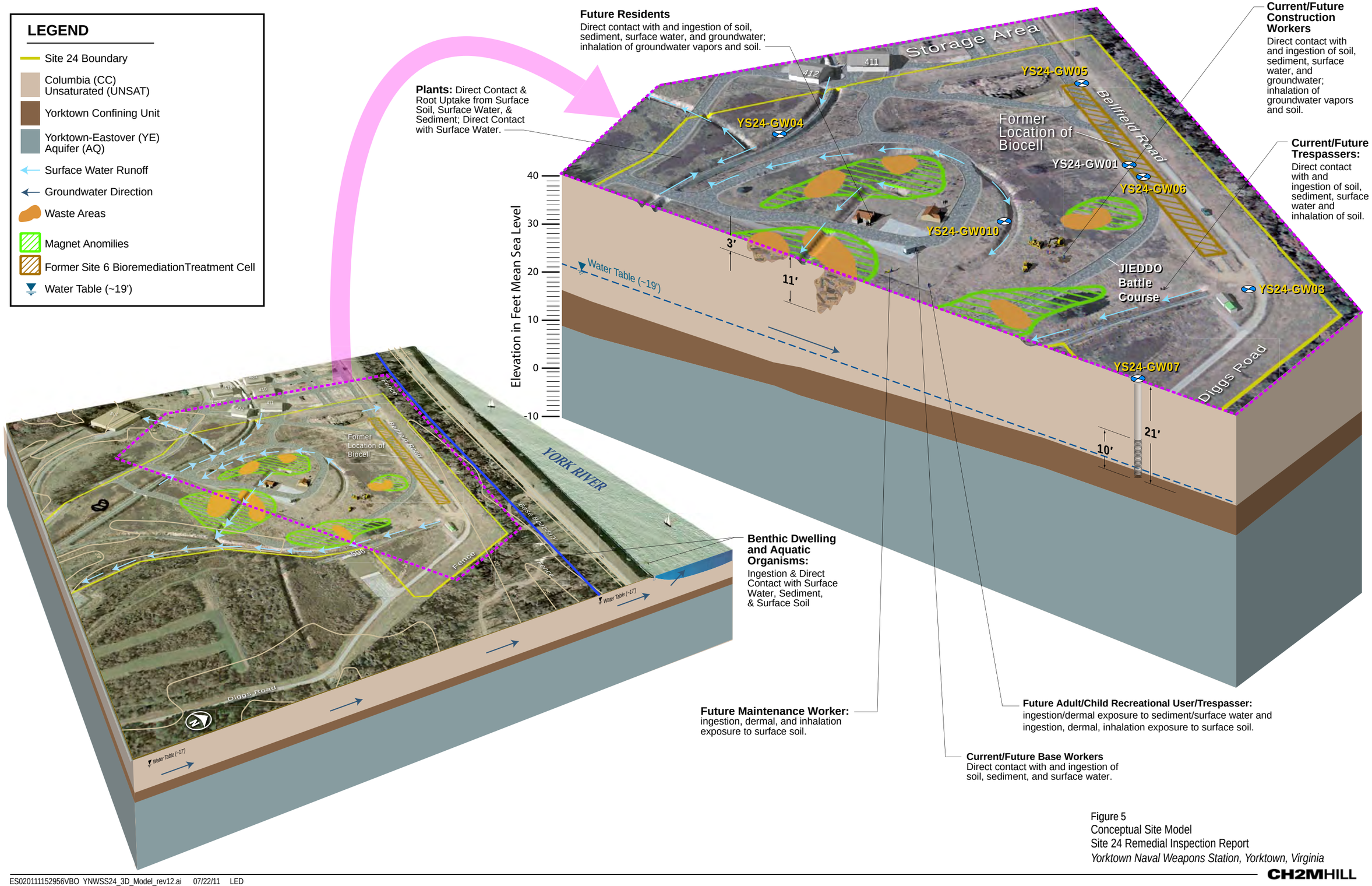


Figure 5
Conceptual Site Model
Site 24 Remedial Inspection Report
Yorktown Naval Weapons Station, Yorktown, Virginia

SECTION 6

Human Health Risk Assessment

This section presents the HHRA for Site 24. The baseline HHRA was conducted to assess the potential human health impacts associated with potentially site-related contamination in groundwater and soil.

This risk assessment has been prepared using conservative assumptions. Exposure pathways based on current site conditions and current and potential future site use were evaluated. Guidance documents used for preparing the risk assessment include *Risk Assessment Guidance for Superfund (RAGS) Part A* (USEPA, 1989), *RAGS Part D* (USEPA, 2001b), *RAGS Part E* (USEPA, 2004), and *RAGS Part F* (USEPA, 2009b).

The HHRA consists of the following components:

- Identification of COPCs
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization
- Uncertainty Assessment

These components are described in the following sections. Spreadsheets were prepared in accordance with *RAGS Part D* (USEPA, 2001b) to identify the COPCs and to calculate risk estimates associated with the COPCs. These spreadsheets are presented in **Appendix L**.

6.1 Identification of COPCs

The identification of COPCs includes data collection, data evaluation, and data screening. The data collection and evaluation involve gathering and reviewing the available site data and identifying the data for use in the risk assessment that meets project-specific data quality objectives (DQOs). These data are then further screened against concentrations that are protective of human health to identify those constituents and media of potential concern that are evaluated in the following sections of the risk assessment.

6.1.1 Data Summary

Detailed results of the sampling that was performed at Site 24 are presented in **Section 2**. All of the data used in the risk assessment have been fully validated. **Table 6-1** lists the samples that were evaluated in the HHRA. With the exception of the groundwater sample collected from GW11 in 2013, all soil and groundwater samples collected in 2010 were evaluated in the HHRA. The groundwater from GW11 was not evaluated in the HHRA as the WPNSTA Yorktown Partnering team (including their associated technical support) agreed that the low level of detected constituents detected in this monitoring well did not warrant inclusion of the data in the HHRA as they were not likely to pose a potential risk to human health.

In accordance with the USEPA Region III *Draft Guidance on the Selection of Analytical Metal Results from Monitoring Well Samples for Use in the Quantitative Assessment of Risk* (USEPA, 1992), unfiltered groundwater samples were used to determine inorganic constituent exposure concentrations because a review of the groundwater data determined that the results from the filtered samples were similar to the results from the unfiltered groundwater samples. Using unfiltered groundwater sample results are considered more conservative than using only the dissolved portion of the sample. Groundwater samples collected from the shallow aquifer (Columbia) and the deep aquifer (Yorktown-Eastover) were evaluated separately.

Four soil exposure areas were evaluated in the risk assessment; soil samples collected from the waste area, soil samples collected from the sludge area, soil samples collected from outside the waste (and sludge) area, and soil samples collected from across the entire site (including the waste area, but not the sludge area). These areas were evaluated to determine if there are potential risks associated with exposure to the sludge and waste areas alone, if there are potential risks associated with exposure across the full site, and if there are potential risks associated with site soil that is not within the waste or sludge area.

6.1.2 Data Evaluation

The validated data collected during site investigations were evaluated to determine reliability for use in the quantitative risk assessments. A review of the data and past discussions with USEPA and the Navy identified the following criteria for data usability and use of qualified data:

- Data qualified with a J, K, or L (estimated) were treated as unqualified, detected concentrations.
- Data qualified with an R (rejected) were not used in the risk assessment.
- Data qualified with a B (blank contamination) were used in the risk assessment as if the results were non-detects, with the blank-related concentrations of each constituent used as the sample detection limit.
- For duplicate samples, the maximum concentration between the two samples was used as the sample concentration.

6.1.2 Selection of COPCs

All of the detected constituents were screened following the procedures described as follows. The selection of COPCs was based on the criteria presented in the USEPA Region 3 *Technical Guidance Manual, Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening* (USEPA, 1993b) and *RAGS Part D* (USEPA, 2001b).

The maximum detected concentration of each constituent for each media and data grouping was compared to the criteria discussed as follows to select the COPCs. If the maximum concentration exceeded the criteria, the constituent was identified as a COPC. Constituents that were not detected in any of the samples or were detected at concentrations less than the criteria were not identified as COPCs. Detection limits for constituents that were not detected were also compared to the screening levels as discussed in **Section 6.5,** the uncertainty assessment. The COPC screening is presented in **Appendix L**, Tables 2.1 through 2.19.

- **Comparison with Health-Based Criteria for Groundwater:** Groundwater data were compared to the USEPA tap water RSLs (USEPA, 2011a). RSLs that are based on non-carcinogenic effects were divided by 10 to account for exposure to multiple constituents that affect the same target organ (such as the kidney). RSLs based on carcinogenic effects were used as presented in the RSL table. Lead concentrations in groundwater were compared to the federal action level for drinking water of 15 μg/L (USEPA, 2009c). Groundwater data were also compared to maximum contaminant levels (MCLs); however, this comparison was not used to identify the COPCs.
- **Comparison with Health-based Criteria for Vapor Intrusion from Groundwater to Indoor Air:** Shallow aquifer groundwater data were also compared to groundwater risk-based screening levels protective of the vapor intrusion exposure pathway, calculated using the methodology described in Appendix D of the *Office of Solid Waste and Emergency Response Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* (USEPA, 2002a). The calculations and resulting screening levels are included in **Appendix L,** Table 2.17 Supplement A.
- **Comparison with Health-based Criteria for Surface Soil and Soil (combined surface and subsurface soil):** The maximum detected constituent concentrations in soil were compared to USEPA residential soil RSLs (USEPA, 2011a). RSLs based on noncarcinogenic effects were divided by 10 to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table. Lead concentrations in soil were compared to the USEPA residential child lead soil screening value of 400 mg/kg (USEPA, 1994).
- **Comparison with Health-based Criteria for Volatile and Fugitive Dust Emissions from Soil:** The maximum detected concentrations in soil were used to model the maximum potential air concentrations. Fugitive emissions from soil were estimated using the particulate emission factor (PEF) approach presented in USEPA's Soil Screening Guidance (USEPA, 1996b). Volatile emissions from soil were estimated using a calculated volatilization factor (VF) (USEPA, 1996b). The modeled ambient air concentrations were compared to USEPA ambient air RSLs (USEPA, 2011a). RSLs based on noncarcinogenic effects were divided by 10 to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table.

- **Essential Human Nutrients:** Constituents that are considered essential nutrients, present at low concentrations (only slightly elevated above naturally occurring levels), and toxic only at very high doses, were eliminated from the quantitative risk analysis. These constituents are calcium, magnesium, potassium, and sodium. Although iron and manganese are also considered essential nutrients and are only toxic at very high doses, they were included in the HHRA because toxicity values are available.

A few of the constituents detected at the site do not have RSLs included in the RSL table. Appropriate surrogate constituents were selected and their RSLs were used for the screening, as identified in the *RAGs Part D* (USEPA, 2001b) Table 2 series presented in **Appendix L**.

The Navy risk assessment policy on use of background data (Navy, 2004) includes comparison of site data to background data, to focus the list of COPCs on those constituents that are site-related and not associated with background conditions. However, following past USEPA Region III risk assessment preferences, this risk assessment did not follow the Navy policy. Therefore, some of the COPCs identified for quantitative evaluation in the risk assessment may not be site related, but may be associated with background conditions.

Table 6-2 summarizes the constituents selected as COPCs for each of the media and data groupings.

6.2 Exposure Assessment

Exposure refers to the potential contact of an individual with a constituent. The exposure assessment identifies pathways and routes by which an individual may be exposed to the COPCs, and estimates the magnitude, frequency, and duration of potential exposure. Constituent intakes and associated health risks are only quantified for complete exposure pathways. The following subsections discuss the components of exposure assessment:

- Develop the CSM for human health
- Calculate exposure point concentrations (EPCs)
- Develop exposure assumptions for potentially complete exposure pathways
- Calculate intake of COPCs

6.2.1 Conceptual Site Model for Human Health

This section provides the basis for developing the CSM for human exposures at Site 24. **Figure 6-1** presents the CSM showing potential human health exposure scenarios identified for current and potential future site use.

6.2.1.1 Physical Characteristics

Site 24, the Aviation Field, is located within WPNSTA Yorktown. WPNSTA Yorktown is located on the York-James Peninsula, which is an embayed portion of the Atlantic Coastal Plain physiographic province. Site 24 includes approximately 14 acres of an open, grassy field surrounding the helicopter landing-pad in the northern portion of WPNSTA Yorktown, just south of the York River. This site is bounded by the WPNSTA Yorktown installation fence line to the north, former railroad tracks to the east, Main Road to the south, and storage areas to the west. Existing structures at Site 24 include a concrete helicopter landing-pad and a paved road that leads from Main Road to the helicopter pad area. Railroad tracks that were present onsite have been removed; however, the stone beds used as the foundation for the tracks remain. A bioremediation cell, constructed in 1999 to treat contaminated soil and sediment from nearby Site 6, was removed from Site 24 in December 2006.

The primary source of contamination at Site 24 is associated with four burial areas (Areas B, C, E, and F) that contain various materials, including inert ordnance debris, rocket motor casings, parachutes, and miscellaneous metal and construction debris. Historical reports indicate that burning activities and disposal of construction debris may also have been conducted in these disposal areas. Impacts to site media could also be associated with a small area with black sludge-like material on the ground surface (Area D).

6.2.1.2 Characterization of Land Use

The mission of WPNSTA is to provide ordnance, technical support, and related services to sustain the war-fighting capability of the armed forces in support of national military strategy. Site 24 is located within a restricted area of WPNSTA and a special access badge is required to enter this area. Furthermore, the site is located inside an area encumbered by the Explosive Safety Quantity Distance (ESQD) and cannot be developed for real estate purposes. Currently, Site 24 and the surrounding area are used by JIEDDO as a training facility. The facility consists of practice roadways and buildings intended for the training of military personnel in the identification and disarmament of improved explosives. This facility was completed in late 2011 and future site use is expected to remain the same.

The predominant source of domestic water supply for WPNSTA Yorktown and surrounding communities is via the City of Newport News Waterworks from a series of surface water reservoirs. Individual homes may obtain water from private wells installed within the Yorktown-Eastover aquifer, but groundwater at the Base flows towards the York River and its tributaries, and there are no private wells between the WPNSTA and the river. There are no drinking water wells at WPNSTA Yorktown; four former water supply wells have been abandoned.

The site is currently used for war games. During military training activities, the military personnel could be exposed to surface soil in the waste area, outside the waste area, and across the site, and combined surface and subsurface soil in the sludge area. The surface and subsurface soil samples collected from the sludge area were combined for the current scenario based on the assumption that concentrations in the sludge would be consistent regardless of the depth the samples were collected. The current industrial worker was conservatively used to evaluate exposure to the soil for military personnel. It is likely that exposure during military training activities would be less than that assumed for an industrial worker, as it is likely the exposure duration and frequency for military personnel would be lower than that of a typical industrial worker. Additionally, although access to the area is restricted, it was assumed that an adult and adolescent trespasser/visitor could contact the surface soil across the site, within the waste area, and outside the waste area, and the surface and subsurface soil in the sludge area. However, it is extremely unlikely an adolescent trespasser/visitor would be able to access this area of the Base. Therefore, although this scenario was included in the HHRA, it is very conservative and unlikely, but was evaluated as a worst case exposure scenario for current un-permitted site use. The adult trespasser/visitor scenario is also unlikely, but there is more of a potential for an adult who is already on-base near Site 24 to access this area.

Potential future site use will likely stay the same as the current site use. However, for a conservative evaluation of potential risks, residential and industrial uses were evaluated as potential future site uses. Although groundwater would most likely not be used as a future potable water supply by industrial workers because WPNSTA already has a potable water supply, this pathway was conservatively evaluated as potentially complete. Additionally, it was conservatively assumed that either shallow or deep aquifer groundwater may be used as a future residential potable water supply, although this is unlikely. Construction workers could also be exposed to shallow groundwater during excavation activities.

As discussed in **Section 6.1.1,** unfiltered groundwater samples were used to determine inorganic constituent exposure concentrations.

Unfiltered groundwater samples were also used to evaluate the construction worker scenario.

Additionally, future industrial workers or residents could be exposed to constituents in indoor air from vapor intrusion from the shallow groundwater into a future building or residence constructed on the site. However, no COPCs were identified for this pathway using the maximum detected concentration of each VOC in shallow groundwater. Therefore, this exposure pathway is not complete, and risks associated with inhalation of indoor air associated with vapor intrusion from groundwater were not quantified in the HHRA.

In summary, the exposure routes quantitatively evaluated in the risk assessment are:

- **Current/Future Industrial Worker (conservatively representative of current military personnel using site for training activities)—**Incidental ingestion of, dermal contact with, and inhalation of particulate emissions from

surface soil in waste area, surface soil outside waste area, and surface soil across site, and incidental ingestion of and dermal contact with soil in sludge area.

- **Current/Future Trespasser/Visitor (adult and adolescent)—**Incidental ingestion of, dermal contact with, and inhalation of particulate emissions from surface soil in waste area, surface soil outside waste area, and surface soil across site, and incidental ingestion of and dermal contact with soil in sludge area.
- **Future Resident (adult and child)—**Incidental ingestion of, dermal contact with, and inhalation of particulate emissions from soil (combined surface and subsurface soil) in waste area, outside waste area, and across site, incidental ingestion of and dermal contact with soil in sludge area, ingestion of shallow and deep aquifer groundwater, and inhalation and dermal contact with shallow and deep aquifer groundwater while showering/bathing.
- **Future Construction Worker—**Incidental ingestion of, dermal contact with soil, and inhalation of particulate emissions from (combined surface and subsurface soil) in waste area, outside waste area, and across site, incidental ingestion of and dermal contact with soil in sludge area, and dermal contact with and inhalation of volatile emissions from shallow groundwater.
- **Future Industrial Worker—**Incidental ingestion of, dermal contact with, and inhalation of particulate emissions from soil (combined surface and subsurface soil) in waste area, outside waste area, and across site, incidental ingestion of and dermal contact with soil in sludge area, and ingestion of shallow aquifer and deep aquifer groundwater.
- **Future Trespasser/Visitor (adult and adolescent)—**Incidental ingestion of, dermal contact with, and inhalation of particulate emissions from soil (combined surface and subsurface soil) in waste area, outside waste area, and across site, and incidental ingestion of and dermal contact with soil in sludge area.

6.2.2 Calculation of Exposure Point Concentrations

EPCs are estimated constituent concentrations that a receptor may contact and are specific to each exposure medium. EPCs may be directly measured or estimated using environmental fate and transport models. Constituent concentrations in soil and groundwater were measured for this assessment. Fate and transport modeling conducted for risk assessment included estimating fugitive dust and volatile emissions from soil for the COPC screening process, and fugitive dust emissions for the EPC calculations, following the methods in USEPA's Soil Screening Guidance Document (USEPA, 2002b), as shown in **Appendix L,** Tables 2.2, 2.2A, 2.4, 2.6, 2.8, 2.10, 2.12, and 2.14**.** No volatile COPCs were retained for groundwater, and therefore, COPCs were not retained for groundwater for inhalation exposure while showering or from an excavation pit.

ProUCL software Version 4.00.05 (USEPA, 2010a) and Version 4.1. (USEPA, 2010b) were used to determine the distribution that the data fit and to calculate the 95 percent upper confidence limits (UCLs) used as the reasonable maximum exposure (RME) and central tendency exposure (CTE) EPCs. An initial set of EPC calculations was performed using the most current version of ProUCL at that time (Version 4.00.05 [USEPA, 2010a]). Based on the results of the initial risk calculations, it was decided to evaluate an additional soil data grouping, and which time an updated version of ProUCL was available (Version 4.1. [USEPA, 2010b]). Therefore, the more current version was used for those EPC calculations. As there were no changes to ProUCL that would have affected the EPCs calculated using Version 4.00.05, no changes were made to the original EPC calculations.

ProUCL identifies three possible data distributions: normal distribution, log-normal distribution, and gamma distribution. The UCL calculation method is then selected based on the data distribution (normal, lognormal, gamma, or nonparametric if the data do not fit any of the distributions). The recommendations outlined in the ProUCL software documentation were followed to select the appropriate UCL to use as the EPC (USEPA, 2010a; 2010b). The maximum detected concentration was used as the EPC in cases where the estimated 95 percent UCL was greater than the maximum detected concentration, the COPC was only detected in one sample in the data set, or less than five samples were available for the data set (the soil in the sludge area).

The EPCs for the COPCs for each medium and data grouping and the rationale for the selected EPC are presented in **Appendix L,** Tables 3.1 through 3.15.

6.2.3 Estimation of Chemical Intakes for Individual Pathways

Chemical intake is the amount of the chemical constituent entering the receptor's body. The intake equation requires specific exposure parameters for each exposure pathway. Exposure parameters are often assumed values, and the magnitude influences the estimates of potential exposure (and risk). The reliability of the values chosen can also contribute to the uncertainty of the resulting risk estimates. Many of the exposure parameters have default values suggested by the USEPA, which were used for this assessment. These assumptions, based on estimates of body weights, media intake levels, and exposure frequencies and duration are provided by USEPA guidance (USEPA, 1989; 1991; 1997b; 2004). Other assumptions (such as the exposure frequency for the trespasser/visitor exposure scenarios) required consideration of location-specific information and were determined using professional judgment. The exposure factors used for each of the scenarios at the site for the RME and CTE scenarios are provided in **Appendix L,** Tables 4.1.RME through 4.7.RME, and 4.1CTE through 4.5.CTE. CTE parameters were only provided for scenarios with RME risks above acceptable risk levels (**Section 6.4**).

The dermal exposure model presented in USEPA's dermal exposure assessment guidance (USEPA, 2004) was used to estimate dermal exposure to groundwater. The values for parameters used in this model (the permeability constant) were obtained from this guidance document and are included in the *RAGS Part D* Table 4 (USEPA, 2001b) series in **Appendix L**. The dermal exposure method presented in USEPA *RAGS Part E* (USEPA, 2004) for soil was used to estimate dermal exposure to soil. This method includes the use of a chemical-specific dermal absorption factor (DABS). The DABS values used in the risk calculations were obtained from USEPA *RAGS Part E* (USEPA, 2004) and include a DABS of 0.13 for the PAHs, a DABS of 0.14 for the PCBs (Aroclor-1254 and Aroclor-1260), a DABS of 0.032 for 2,4,6-TNT, a DABS of 0.1 for the pesticides, SVOC, and 2,4-DNT, a DABS of 0.03 for arsenic, a DABS of 0.001 for chromium, and a DABS of 0.01 for the additional metals.

6.3 Toxicity Assessment

Toxicity assessment defines the relationship between the magnitude of exposure and possible severity of adverse effects, and weighs the quality of available toxicological evidence. Toxicity assessment generally consists of two steps: hazard identification and dose-response assessment. Hazard identification is the process of determining the potential adverse effects from exposure to the constituent along with the type of health effect involved. Dose-response assessment is the process of quantitatively evaluating the toxicity information and characterizing the relationship between the dose of the constituent administered or received and the incidence of adverse health effects in the exposed population. Toxicity criteria (such as reference doses [RfDs] and slope factors) are derived from the dose-response relationship.

The USEPA recommends that a tiered approach be used to obtain the toxicity values, the RfDs, inhalation reference concentrations (RfCs), cancer slope factors (CSFs), and inhalation unit risk factors (IURs) used to calculate non-cancer and cancer risks (USEPA, 2003). The sources of toxicity values are as follows:

- The USEPA's Integrated Risk Information System (IRIS) database (USEPA, 2011b).
- The Provisional Peer Reviewed Toxicity Value (PPRTV) database maintained by the USEPA's National Center for Environmental Assessment (NCEA) and the Superfund Health Risk Technical Support Center.
- Other USEPA and non-USEPA sources including:
  - NCEA
  - Agency for Toxic Substances and Disease Registry, Health Effects Assessment Summary Tables (USEPA, 1997b)
  - California Environmental Protection Agency (Cal EPA)
  - USEPA's Office of Water and the World Health Organization

The use of provisional toxicity values, such as those from the PPRTV database, increases the uncertainty of the quantitative risk estimate.

If no toxicity values were available for a detected constituent, surrogate constituents were selected and their RSLs were used for the COPC selection process. Surrogates were selected based on previous recommendations from USEPA. The surrogates are identified in Tables 2.1 through 2.19 in **Appendix L**. None of the constituents screened during the COPC selection process using surrogates were identified as COPCs.

USEPA-derived oral chronic and subchronic RfDs and inhalation RfCs, and associated uncertainty factors (UFs) and modifying factors, for the COPCs are listed in **Appendix L**, Tables 5.1 and 5.2. USEPA-derived oral CSFs and inhalation IURs are listed in **Appendix L**, Tables 6.1 and 6.2.

Dermal RfDs and CSFs were calculated from the oral RfDs and CSFs using an oral to dermal adjustment factor, or gastrointestinal (GI) absorption factor. This factor is designed to convert the orally administered dose toxicity factors to dermally absorbed dose toxicity factors (USEPA, 2004). The oral RfDs were converted to dermal RfDs by multiplying by the GI absorption factor, and the oral CSFs were converted to dermal CSFs by dividing by the GI absorption factor. If a chemical-specific GI absorption factor was not available or was greater than 50 percent, a GI absorption factor of 100 percent was assumed. The dermal RfDs are included in **Appendix** L, Table 5.1. The dermal CSFs are presented in **Appendix L,** Table 6.1.

6.3.1 Toxicity Information for Non-carcinogenic Effects

Non-carcinogenic health effects include a variety of toxic effects on body systems, ranging from toxicity to the kidneys to central nervous system disorders. The toxicity of a chemical is assessed through a review of toxic effects noted in short-term (acute) animal studies, long-term (chronic) animal studies, and epidemiological investigations.

USEPA (1989) defines the chronic RfD or RfC as a dose that is likely to be without appreciable risk of deleterious effects during a lifetime of exposure. Chronic RfDs and RfCs are specifically developed to be protective for long-term exposure to a compound (for example, 7 years to a lifetime), and consider uncertainty in the toxicological database and sensitive receptors. Subchronic RfDs and RfCs (applicable for exposures less than 7 years), which are all provisional values (that is, not verified by USEPA), were used for the construction worker scenario.

In the development of RfDs and RfCs, all available studies examining the toxicity of a chemical following exposure are considered on the basis of scientific merit. The lowest dose level at which an observed toxic effect occurs is identified as the Lowest Observed Adverse Effect Level (LOAEL), and the dose at which no effect is observed is identified as the No Observed Adverse Effect Level (NOAEL). Several UFs may be applied to account for uncertainties such as data quality, extrapolation of data from animal studies to human exposures, or the use of subchronic studies to develop chronic criteria. These UFs range from 1 to 3,000, and are based on professional judgment. Consequently, there are varying degrees of uncertainty in the toxicity criteria.

6.3.2 Toxicity Information for Carcinogenic Effects

Potential carcinogenic effects are quantified using oral CSFs or inhalation IURs, CSFs and IURs may be derived from the results of chronic animal bioassays, human epidemiological studies, or both. Animal bioassays are usually conducted at dose levels that are much higher than are likely to be encountered in the environment. This design detects possible adverse effects in the relatively small test populations used in the studies. The actual risks from exposure to a potential carcinogen are not likely to exceed the estimated risks and are probably much lower or even zero.

6.3.3 Approach for Potential Mutagenic Effects

Consistent with the Cancer Guidelines and Supplemental Guidance (USEPA, 2005a; 2005b), for COPCs which act via a mutagenic mode of action (MMOA), cancer risks were estimated using age-dependent adjustment factors (ADAFs). Chromium and carcinogenic PAHs were the only COPCs that are categorized as chemicals with an MMOA. The calculation of cancer risk using ADAFs is presented in **Appendix L,** Table**s** 7.6**.**RME Supplement A and 7.4.CTE Supplement A. As chemical-specific data are not available for chromium or the carcinogenic PAHs, default ADAFs, as included in the USEPA RSL Table User's Guide (USEPA, 2011a), were used for the MMOA evaluation.

6.3.4 Constituents for Which USEPA Toxicity Values Are Not Available

Most of the constituents detected at Site 24 have toxicity factors and USEPA RSLs. Detected constituents that did not have RSLs were compared to RSLs for appropriate surrogate constituents during the COPC selection process, as discussed previously. Lead, which does not have an RSL or applicable surrogate, is evaluated by USEPA based on blood-lead uptake using a physiologically based pharmakokinetic model called the Integrated Exposure Uptake Biokinetic (IEUBK) Model. As a screening tool, lead is screened at 400 mg/kg in soil and 15 μg/L in groundwater based on residential exposure. Lead was not detected in site media at concentrations above these screening levels.

6.4 Risk Characterization

Risk characterization combines the results of the previous elements of the risk assessment to evaluate the potential health risks associated with exposure to the COPCs. The risk characterization is then used as an integral component in remedial decision making and selection of potential remedies or actions, as necessary.

6.4.1 Methods for Estimating Risks

Potential human health risks are discussed independently for carcinogenic and non-carcinogenic constituents because of the different toxicological endpoints, relevant exposure duration, and methods used to characterize risk. Exposure to some constituents may result in both non-carcinogenic and carcinogenic effects (such as arsenic), and therefore, these constituents were evaluated in both groups. The methodology used to estimate non-carcinogenic hazards and carcinogenic risks are described as follows.

6.4.1.1 Non-carcinogenic Hazard Estimation.

Non-carcinogenic health risks are estimated by comparing the calculated exposures to RfDs (or RfCs). The calculated intake divided by the RfD (or RfC) is equal to the hazard quotient (HQ):

$$HQ = Intake / RfD \text{ (or RfC)}$$

The intake and RfD represent the same exposure route (oral intakes are divided by oral RfDs). An HQ that exceeds 1 (that is, the intake exceeds the RfD or RfC) indicates that there is a potential for adverse health effects associated with exposure to that constituent.

To assess the potential for non-carcinogenic health effects posed by exposure to multiple constituents, a hazard index (HI) approach is used (USEPA, 1986). This approach assumes that non-carcinogenic hazards associated with exposure to more than one constituent are additive (HI = sum of the HQs). Synergistic or antagonistic interactions between constituents are not considered. HIs may be added across exposure routes to estimate the total non-carcinogenic health effects to a receptor posed by exposure through multiple routes. An HI greater than 1 indicates that there is some potential for adverse non-carcinogenic health effects associated with exposure to the COPCs, possibly warranting remedial action. If the HI is greater than 1, separate HIs are calculated for each target organ/effect to determine if the HI for any specific target organs/effects is greater than 1. If the HI for each target organ does not exceed 1, it can be assumed that there is no non-carcinogenic hazard to the receptor above USEPA's acceptable hazard level.

6.4.1.2 Carcinogenic Risk Estimation.

The potential for carcinogenic effects due to exposure to site-related constituents is evaluated by estimating the excess lifetime carcinogenic risk (ELCR). ELCR is the incremental increase in the probability of developing cancer during one's lifetime in addition to the background probability of developing cancer.

Carcinogenic risk for ingestion and dermal exposure is calculated by multiplying the intake by the CSF.

$$ELCR = Intake \times CSF$$

Carcinogenic risk for inhalation exposure is calculated by multiplying the intake by the IUR:

$$ELCR = Intake \times IUR$$

The combined risk from exposure to multiple constituents was evaluated by adding the risks from individual constituents. Risks were also added across the exposure routes if an individual would be exposed through multiple routes.

When a cumulative carcinogenic risk to an individual receptor under the assumed RME exposure conditions at the site exceeds 100 in a million (10^{-4} ELCR), CERCLA generally requires remedial action to reduce risks at the site (USEPA, 1991). If the cumulative risk is less than 10^{-4}, action generally is not required but may be warranted if a chemical-specific standard (for example, the MCL) is exceeded. A risk-based remedial decision could be superseded by the presence of non-carcinogenic impact or environmental impact requiring action at the site.

6.4.2 Risk Characterization for Site 24

The results of the risk characterization are presented as follows, by receptor. The risk calculations are presented in **Appendix L**, Tables 7.1.RME through 7.10.RME, and 7.1.CTE through 7.6.CTE. A summary of the RME results is presented in Tables 9.1.RME through 9.10.RME and **Table 6-3,** and a summary of the CTE results is shown in Tables 9.1.CTE through 9.6.CTE and **Table 6-4**. CTE risks were calculated only when the RME noncarcinogenic hazards exceeded 1 or the RME carcinogenic risks exceeded 10^{-4}.

6.4.1.3 Current/Future Adult Trespasser/Visitor (Appendix L, Table 9.1.RME)

The risk assessment assumed that a current/future adult trespasser/visitor could be exposed to surface soil in the waste area, across the site, or outside the waste area, or to the combined surface and subsurface soil from the sludge area through incidental ingestion, dermal contact, and inhalation of particulate emissions.

The RME noncarcinogenic hazard associated with exposure to surface soil in the waste area (HI = 0.2) is below USEPA's target HI of 1. The RME carcinogenic risk (CR = 2×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to surface soil across the site (HI = 0.06) is below USEPA's target HI of 1. The RME carcinogenic risk (CR = 4×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to surface soil outside the waste area (HI = 0.03) is below USEPA's target HI of 1. The RME carcinogenic risk (CR = 4×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined soil in the sludge area (HI = 0.009) is below USEPA's target HI of 1. The RME carcinogenic risk (CR = 6×10^{-7}) is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

6.4.1.4 Current/Future Adolescent Trespasser/Visitor (Appendix L, Table 9.2.RME)

The risk assessment assumed that a current/future adolescent trespasser/visitor could be exposed to surface soil in the waste area, across the site, or outside the waste area, or to the combined surface and subsurface soil from the sludge area through incidental ingestion, dermal contact, and inhalation of particulate emissions.

The RME noncarcinogenic hazard associated with exposure to surface soil in the waste area (HI = 0.4) is below USEPA's target HI of 1. The RME carcinogenic risk (CR = 2×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to surface soil across the site (HI = 0.1) is below USEPA's target HI of 1. The RME carcinogenic risk (CR = 3×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to surface soil across outside the waste area (HI = 0.05) is below USEPA's target HI of 1. The RME carcinogenic risk (CR = 3×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined soil in the sludge area (HI = 0.02) is below USEPA's target HI of 1. The RME carcinogenic risk (CR = 7×10^{-7}) does not exceed USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

6.4.1.5 Current/Future Industrial Worker (Appendix L, Tables 9.3.RME and 9.1.CTE)

The risk assessment assumed that a current/future industrial worker could be exposed to surface soil in the waste area, across the site, or outside the waste area, or to the combined surface and subsurface soil from the sludge area through incidental ingestion, dermal contact, and inhalation of particulate emissions.

The RME noncarcinogenic hazard associated with exposure to surface soil in the waste area (1) equals the acceptable HI of 1. The hazard is primarily associated with ingestion of cadmium (HI = 1). There are no target organ/target effects with HIs above 1. The RME carcinogenic risk (1×10^{-5}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}. The CTE non-carcinogenic hazard (HI = 0.4) is below USEPA's acceptable HI.

The RME noncarcinogenic hazard associated with exposure to surface soil across the site (0.3) is below USEPA's target HI of 1. The RME carcinogenic risk (2×10^{-5}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to surface soil outside the waste area (0.1) is below USEPA's target HI of 1. The RME carcinogenic risk (2×10^{-5}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined soil in the sludge area (0.05) is below USEPA's target HI of 1. The RME carcinogenic risk (4×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

6.4.1.6 Future Adult Resident (Non-carcinogenic Hazard) (Appendix L, Tables 9.4.RME and 9.2.CTE)

The risk assessment assumed that a future adult resident could be exposed to combined surface and subsurface soil in the waste area, across the site, outside of the waste area, or in the sludge area through incidental ingestion, dermal contact, and inhalation of particulate emissions, and to shallow or deep groundwater used as a potable water supply through ingestion and dermal contact.

The RME non-carcinogenic hazard associated with exposure to soil in the waste area (HI = 2) is above the acceptable HI of 1. The hazard is associated with Aroclor-1254 (HQ = 1), cadmium (HQ = 0.8), and copper (HQ = 0.2), however, there are no target organ/target effects with HIs above 1. The CTE non-carcinogenic hazard from soil in the waste area (HQ = 0.7) does not exceed USEPA's target HI of 1.

The RME noncarcinogenic hazards associated with exposure to soil across the site (HI = 0.7), soil outside the waste area (HI = 0.4), and soil in the sludge area (HI = 0.06) are below USEPA's target HI of 1.

The RME non-carcinogenic hazard associated with groundwater from the shallow and deep aquifers (both His = 0.2) are below the acceptable HI of 1.

The cumulative hazards to the adult resident based on exposure to soil from one of the soil groupings and either shallow or deep groundwater are shown in **Table 6-5**. Assuming potable use of groundwater and exposure to the soil grouping with the highest hazard (soil in waste area) the cumulative HI slightly exceeds USEPA's target HI (HI = 3), primarily associated with Aroclor-1254 in soil, with a smaller contribution from cadmium and copper. Aroclor-1254 was only detected in five of the 93 samples collected in the waste area. There are no target organ/target effects with HIs above 1 based on this cumulative exposure (maximum target organ HI is 1.2, but when rounded to the correct significant digits for comparison to the target HI of 1, does not exceed 1). The CTE noncarcinogenic hazard (HI = 0.8), does not exceed USEPA's acceptable hazard level (**Table 6-4**).

6.4.1.7 Future Child Resident (Non-carcinogenic Hazard) (Appendix L, Tables 9.5.RME and 9.3.CTE)

The risk assessment assumed that a future child resident could be exposed to combined surface and subsurface soil in the waste area, across the site, outside the waste area, or in the sludge area through incidental ingestion, dermal contact, and inhalation of particulate emissions, and to shallow or deep groundwater used as a potable water supply through ingestion and dermal contact.

The RME non-carcinogenic hazard associated with soil in the waste area (HI = 21) is above the acceptable HI of 1.0. The hazard is primarily associated with Aroclor-1254 (HQ = 10), aluminum (HQ = 1), cadmium (HQ = 7), copper (HQ = 2), chromium (HQ = 0.2), cobalt (HQ = 0.2), and iron (HQ = 0.2). The CTE non-carcinogenic hazard from soil in the waste area (HI = 6) also exceeds USEPA's target HI of 1.

The RME noncarcinogenic hazard associated with exposure to soil across the site (HI = 6) exceeds USEPA's target HI of 1. The hazard is primarily associated with Aroclor-1254 (HQ = 3), cadmium (HQ = 1), aluminum (HQ = 0.3), arsenic (HQ = 0.8), chromium (HQ = 0.2), copper (HQ = 0.3), and iron (HQ = 0.2). The CTE non-carcinogenic hazard (HI = 2) also exceeds USEPA's target HI of 1. However, for the CTE, there are no target organ/target effects with HIs above 1.

The RME noncarcinogenic hazard associated with exposure to soil outside the waste area (HI = 2) exceeds USEPA's target HI of 1. The hazard is primarily associated with arsenic (HI = 1). There are no target organ/target effects with HIs above 1. The CTE non-carcinogenic hazard (HI = 0.5) is below USEPA's target HI of 1.

The RME noncarcinogenic hazard associated with exposure to soil in the sludge area (HI = 0.6) is below USEPA's target HI of 1.

The RME non-carcinogenic hazards associated with groundwater from the shallow aquifer (HI = 0.4) and deep aquifer (HIs = 0.5) are below the acceptable HI of 1.

The cumulative hazards to the child resident based on exposure to soil from one of the soil groupings and either shallow or deep groundwater are shown in **Table 6-5**. Assuming potable use of groundwater and exposure to the soil grouping with the highest hazard (soil in waste area) the cumulative HI exceeds USEPA's target HI (HI = 22), primarily associated with Aroclor-1254 in soil, with a smaller contribution from cadmium, aluminum, arsenic, chromium, copper, and iron. Aroclor-1254 was only detected in five of the 93 samples collected in the waste area, and cadmium. The CTE noncarcinogenic hazard (HI = 9), also exceeds USEPA's acceptable hazard level. The RME cumulative hazard associated with exposure to groundwater and soil across the site also exceed USEPA's target HI.

6.4.1.8 Future Lifetime Resident (Child + Adult) (Carcinogenic Risk) (Appendix L, Tables 9.6.RME and 9.4.CTE)

The risk assessment assumed that a future lifetime child/adult resident could be exposed to combined surface and subsurface soil in the waste area, across the site, outside of the waste area, or in the sludge area through incidental ingestion, dermal contact, and inhalation of particulate emissions, and to shallow or deep groundwater used as a potable water supply through ingestion and dermal contact.

The RME carcinogenic risk associated with soil in the waste area (CR = $3x10^{-4}$) is above USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$. Chromium is the primary contributor to the estimated risk, with smaller contributions (below $1x10^{-4}$) from Aroclor-1254, benzo(a)pyrene, Aroclor-1260, and arsenic. The CTE carcinogenic risk (CR = $5x10^{-5}$) is within USEPA's target risk range.

Chromium is the main contributor to the carcinogenic risk associated with the soil in the waste area. The analytical data for chromium are for total chromium; however, the RSL used for the screening is for hexavalent chromium, the more toxic (and carcinogenic) valence state. In the past, prior to including the New Jersey Environmental Protection Agency (NJ EPA) oral CSF for hexavalent chromium in the table, USEPA's RSL table presented a residential soil RSL for total chromium assuming a 1 to 6 ratio of hexavalent chromium to trivalent chromium. Assuming this ratio applies for soil in the waste area, the maximum concentration of hexavalent chromium (the total measured chromium concentration multiplied by 1/6) would not result in an unacceptable risk associated with exposure to the chromium. It should also be noted that there is some uncertainty associated with the hexavalent chromium oral CSF and RSL, as the value is from the NJ EPA and has not been included in USEPA's IRIS database. Elimination of chromium as a risk driver would result in the risk associated with exposure to the soil in the waste area to be within USEPA's target levels.

The RME carcinogenic risk associated with exposure to soil across the site (CR = $2x10^{-4}$) is above USEPA's target risk range of 10^{-6} to 10^{-4}. Chromium is the primary contributor to the estimated risk, with smaller contributions

(below $1x10^{-4}$) from Aroclor-1254, arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene. The CTE carcinogenic risk (CR = $5x10^{-5}$) is within USEPA's target risk range of 10^{-6} to 10^{-4}.

As for soil in the waste area, chromium is the main contributor to the carcinogenic risk associated with the soil across the site. If the same argument suggested for soil in the waste area is applied to the soil across the site, the maximum concentration of hexavalent chromium (the total measured chromium concentration multiplied by 1/6) would not result in an unacceptable risk associated with exposure to the chromium. Elimination of chromium as a risk driver would result in the risk associated with exposure to the soil across the site to be within USEPA's target levels.

The RME carcinogenic risk associated with exposure to soil outside the waste area (CR = $2x10^{-4}$) is above USEPA's target risk range of 10^{-6} to 10^{-4}. Chromium is the primary contributor to the estimated risk, with smaller contributions (below $1x10^{-4}$) arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene. The CTE carcinogenic risk (CR = $4x10^{-5}$) is within USEPA's target risk range of 10^{-6} to 10^{-4}.

As for soil in the waste area and across the site, chromium is the main contributor to the carcinogenic risk associated with the soil across the site. If the same argument suggested for the other soil groupings is applied to the soil across the site, the maximum concentration of hexavalent chromium (the total measured chromium concentration multiplied by 1/6) would not result in an unacceptable risk associated with exposure to the chromium. Elimination of chromium as a risk driver would result in the risk associated with exposure to the soil outside the waste area to be within USEPA's target levels.

The RME carcinogenic risk associated with exposure to soil in the sludge (CR = $6x10^{-5}$) is within USEPA's target risk range of 10^{-6} to 10^{-4}.

The RME carcinogenic risk associated with exposure to groundwater from the shallow aquifer (CR = $1x10^{-5}$) is within USEPA's target risk range of 10^{-6} to 10^{-4}. The RME carcinogenic risk associated with exposure to groundwater from the deep aquifer (CR = $3x10^{-6}$) is within USEPA's target risk range of 10^{-6} to 10^{-4}.

The cumulative carcinogenic risks to the lifetime resident based on exposure to soil from one of the soil groupings and either shallow or deep groundwater are shown in **Table 6-5**. Assuming potable use of groundwater with the highest risk (the shallow groundwater) and exposure to the soil grouping with the highest risk (soil in waste area), the cumulative carcinogenic risk exceeds USEPA's target carcinogenic risk range (CR = $3x10^{-4}$), primarily associated with chromium in the soil. The CTE carcinogenic risk (CR = $6x10^{5}$), is within USEPA's acceptable risk level (**Table 6-4**). The RME cumulative carcinogenic risks for soil from all of the groupings (with the exception of the sludge area) and groundwater exceed USEPA's target carcinogenic risk range, primarily associated with chromium in soil.

6.4.1.9 Future Construction Worker, Appendix L, Tables 9.7.RME and 9.5.CTE

The risk assessment assumes that a future construction worker could be exposed to combined surface and subsurface soil in the waste area, across the site, outside the waste area, or in the sludge area through incidental ingestion, dermal contact, and inhalation of particulate emissions, and shallow groundwater through dermal contact and inhalation of volatiles during excavation and construction activities.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil in the waste area (HI = 4) is above USEPA's acceptable HI of 1. The hazard is primarily associated with Aroclor-1254 (HQ = 1), cadmium (HQ = 1), copper (HQ = 1), and aluminum (HQ = 0.2). There are no target organs with HIs above 1. The RME carcinogenic risk (2×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}. The CTE noncarcinogenic hazard (HI = 0.8) is below USEPA's acceptable HI of 1.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil across the site (HI = 0.1) does not exceed USEPA's acceptable HI of 1. The RME carcinogenic risk (2×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil outside the waste area (HI = 0.6) is below the acceptable HI of 1.The RME carcinogenic risk (CR = 2×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined soil in the sludge area (HI = 0.03) is below the acceptable HI of 1.The RME carcinogenic risk (CR = 2×10^{-7}) is below USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME non-carcinogenic hazard (HI = 0.04) and the RME carcinogenic risk (CR 6×10^{-8}) associated with exposure to groundwater from the shallow aquifer are below the applicable USEPA acceptable levels.

The cumulative noncarcinogenic hazards and carcinogenic risks to the construction worker based on exposure to soil from one of the soil groupings and shallow groundwater are shown in **Tables 6-5** and **6-6**. Assuming exposure to shallow groundwater in an excavation and exposure to the soil grouping with the highest hazard and risk (soil in waste area), the cumulative HI exceeds USEPA's target noncarcinogenic hazard (HI = 4), primarily associated with Aroclor-1254, cadmium, copper, and aluminum in the soil. There are no target organ/target effects with HIs above 1 based on this cumulative exposure (maximum target organ HI is 1.3, but when rounded to the correct significant digits for comparison to the target HI of 1, does not exceed 1). The CTE noncarcinogenic hazard (HI = 0.8), is below USEPA's acceptable HI of 1 (**Table 6-4**). The cumulative carcinogenic risk (CR = $2\text{x}10^{-6}$) is within USEPA's target risk range. Cumulative noncarcinogenic hazards and carcinogenic risks based on groundwater and the other soil groupings are all within or below acceptable hazard and risk levels.

6.4.1.10 Future Industrial Worker, Appendix L, Tables 9.8.RME and 9.6.CTE

The risk assessment assumed that a future industrial worker could be exposed to combined surface and subsurface soil in the waste area, across the site, outside the waste area, or in the sludge area (see the current industrial worker summary) through incidental ingestion, dermal contact, and inhalation of particulate emissions and to shallow or deep groundwater used as a potable water supply through ingestion.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil in the waste area (HI = 2) is above the acceptable HI of 1. The hazard is primarily associated with exposure to Aroclor-1254 (HQ = 1) and cadmium (HQ = 0.6). There are no target organs with HIs above 1. The CTE noncarcinogenic hazard associated with exposure to combined soil in the waste area (HI = 0.6) is below USEPA's acceptable HI. The RME carcinogenic risk (CR = 3×10^{-5}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil across the site (HI = 0.6) is below the USEPA's acceptable HI of 1.0. The RME carcinogenic risk (3×10^{-5}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil outside the waste area (HI = 0.1) is below the USEPA's acceptable HI of 1.0. The RME carcinogenic risk (2×10^{-5}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard (HI = 0.03) and the carcinogenic risk (CR = 2×10^{-6}), associated with exposure to groundwater from the shallow aquifer are below or within USEPA's target acceptable level of 1 and risk range of 10^{-6} to 10^{-4}.

The RME noncarcinogenic hazard (HI = 0.05) and the carcinogenic risk (CR = 3×10^{-7}), associated with exposure to groundwater from the deep aquifer are below USEPA's target acceptable level of 1 and risk range of 10^{-6} to 10^{-4}.

The cumulative noncarcinogenic hazard to the industrial worker based on exposure to soil from one of the soil groupings and either shallow or deep groundwater are is shown in **Table 6-5**. Assuming potable use of groundwater with the highest hazard (the deep aquifer groundwater) and exposure to the soil grouping with the highest hazard (soil in waste area), the cumulative HI exceeds USEPA's target noncarcinogenic hazard (HI = 2), primarily associated with Aroclor-1254 and cadimum in the soil. The CTE noncarcinogenic hazard (HI = 0.6) is below USEPA's acceptable noncarcinogenic hazard level. The cumulative carcinogenic risk, as shown in **Table 6-6**, (CR = $4\text{x}10^{-5}$) is within USEPA's acceptable risk range. Cumulative noncarcinogenic hazards and carcinogenic risks based on all other groundwater and soil groupings are all within or below acceptable hazard and risk levels.

6.4.1.11 Future Adult Trespasser/Visitor, Appendix L, Table 9.9.RME

The risk assessment assumed that a future adult trespasser/visitor could be exposed to combined surface and subsurface soil in the waste area, across the site, outside the waste area, or in the sludge area (see the current adult trespasser/visitor summary) through incidental ingestion, dermal contact, and inhalation of particulate emissions.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil in the waste area (HI = 0.4) is below the USEPA's acceptable HI of 1. The RME carcinogenic risk (CR = 5×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil across the site (HI = 0.1) is below the USEPA's acceptable HI of 1. The RME carcinogenic risk (5×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil outside the waste area (HI = 0.03) is below the USEPA's acceptable HI of 1. The RME carcinogenic risk (4×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

6.4.1.12 Future Adolescent Trespasser/Visitor, Appendix L, Table 9.10.RME

The risk assessment assumed that a future adolescent trespasser/visitor could be exposed to combined surface and subsurface soil in the waste area, across the site, outside the waste area, or in the sludge area (see the current adolescent trespasser/visitor summary) through incidental ingestion, dermal contact, and inhalation of particulate emissions.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil in the waste area (HI = 0.7) is below the USEPA's acceptable HI of 1. The RME carcinogenic risk (CR = 5×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil across the site (HI = 0.3) is below the USEPA's acceptable HI of 1.0. The RME carcinogenic risk (4×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

The RME noncarcinogenic hazard associated with exposure to combined surface and subsurface soil outside the waste area (HI = 0.05) is below the USEPA's acceptable HI of 1.0. The RME carcinogenic risk (3×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4}.

6.5 Uncertainty Associated with Human Health Assessment

The risk measures used in CERCLA site risk assessments are not fully probabilistic estimates of risk, but are conditional estimates given that a set of assumptions about exposure and toxicity are realized. Thus, it is important to specify the assumptions and uncertainties inherent in the risk assessment to place the risk estimates in proper perspective.

6.5.1 General Uncertainty in COPC Selection

The sampling conducted at Site 24 generally focused on areas of known or suspected impact from past site use, based on previous sampling information. Therefore, the uncertainty in sampling and the possibility of missing a location impacted by site constituents are expected to be minimal. The uncertainty associated with the data analysis is minimal, as the data were fully validated prior to use in the risk assessment.

The general assumptions used in the COPC selection process were conservative to ensure that true 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.

Although Navy risk assessment policy eliminates any constituents that are detected at background levels from consideration as a COPC during the COPC screening, a comparison of site concentrations to background concentrations was not used to select the COPCs for this HHRA, in accordance with USEPA Region 3 preference.

Following the USEPA approach may result in the inclusion of risks that may be associated with background conditions and are not necessarily site-related, resulting in over-estimation of risks for the site. The COPCs identified for combined surface and subsurface soil (the primary media of concern based on human risks at the site) that were below background levels are identified here. For soil in the waste area, arsenic was identified as a COPC, however, the maximum detected concentration was within the Cheatham Annex/Yorktown background level (**Appendix L**, Table 2.9). Elimination of arsenic as a COPC for the soil in the waste area would not change the results of the HHRA for the waste area soil. For soil across the entire site, antimony was identified as a COPC, however the maximum detected concentration was below the Cheatham Annex/Yorktown background concentration (**Appendix L**, Table 2.11). For soil outside the waste area, both aluminum and antimony were identified as COPCs, however their maximum detected concentrations were with Cheatham Annex/Yorktown background concentrations (**Appendix L**, Table 2.13). For the sludge area soil, chromium, cobalt, and iron were identified as COPCs, however they were within background levels (see **Appendix L**, Table 2.7). Therefore, risks and hazard from exposure to these COPCs are associated with background conditions and are not site related.

Detection limits for constituents that were not detected within a media were compared to the screening levels to determine if there are any non-detected constituents with detection limits above the screening level. There were a few VOCs, SVOCs, and explosives detected in soil with detection limits above the screening level, however, all were within an order of magnitude or two above the screening level, and would not result in unacceptable risks if they were present at concentrations below their detection limit. For groundwater, there are a number of non-detected VOCs, SVOCs, and explosives with detection limits above the screening level, including a few with detection limits over two orders of magnitude above the screening levels (that is, detection limits above a carcinogenic risk level of 10^{-4} or a hazard of 10). Based on the minimal amount of organics that were detected in the groundwater and retained as COPCs, it is not expected many (if any) of these organics are present in the groundwater. However, it is possible they could be present in the groundwater at levels of potential concern even though they were not detected, therefore, the risks associated with groundwater may be underestimated.

6.5.2 Uncertainty Associated with Exposure Assessment

Uncertainty in the exposure assessment was generally treated with conservative decision rules and assumptions, and therefore the uncertainty likely overestimates actual exposure to COPCs. The use of an industrial worker scenario to evaluate risks to the current site worker, military personal who use the site for training, results in an overestimate of the risks to current workers at the site. Additionally, several exposure pathways evaluated by this HHRA, such as residential land use and potable use of shallow groundwater, are hypothetical and are not anticipated to occur in the future at Site 24. It is not likely that groundwater from the shallow aquifer would ever be used as a potable or industrial water supply because of the availability of better water supplies with respect to both water quality and quantity.

Site-related contamination is expected to change over time due to naturally occurring attenuation processes (such as degradation due to weathering, volatilization, advection, dispersion, transformation, and leaching due to infiltrating precipitation). The risk assessment assumed that concentrations would remain constant throughout the exposure period and that these concentrations occur everywhere throughout the site. This assumption may results in an over- or under-estimation of risk. A detailed discussion on the fate and transport of the chemicals detected at Site 24 is included in **Section 5.2**.

The exposure factors used for the quantitation of exposure were conservative and reflect worst-case or upper-bound assumptions on the exposure. The reliability of the values chosen for the exposure factors also contributes substantially to the uncertainty of the resulting risk estimates. Because most of the exposure factors are worst-case or upper-bound assumptions, the resulting risks are worst-case and likely overestimate the actual risk.

The future soil exposure scenario adds additional conservatism by assuming that the subsurface soil will become surface soil during any future construction activities, and that future receptors may come in contact with what is the current surface soil and current subsurface soil in the future. During many construction projects, clean fill material such as topsoil is placed over the soil that is disturbed during excavation projects. The topsoil material is generally needed to support growth of grass and other landscape plants. This would decrease the possibility of future exposure to both the current surface and subsurface soil after any construction activities.

6.5.3 Uncertainty Associated with Toxicity Assessment

Uncertainty associated with the non-carcinogenic toxicity factors is included in the toxicity tables (**Appendix L**, Tables 5.1 and 5.2). Several UFs were applied to extrapolate dose points from animal studies to humans. These UFs range between 1 and 3,000. Additional modification factors are used on the basis of USEPA's professional judgment. Therefore, there is a high degree of uncertainty in the non-carcinogenic toxicity criteria based on the available scientific data for each constituent. The non-carcinogenic toxicity factors are most likely overestimates of actual toxicity.

Use of provisional toxicity factors increases the uncertainty of the quantitative hazard and risk estimates. These provisional values were used to provide a quantitative estimate rather than a merely qualitative risk discussion; however, these values should be interpreted cautiously because USEPA has not approved these toxicity values.

The uncertainty associated with CSFs is mostly associated with the low dose extrapolation where carcinogenicity at low doses is assumed to be a linear response. This is a conservative assumption, which introduces a high uncertainty into slope factors that are extrapolated from this area of the dose-response curve. The CSFs are based on the assumption that there is no threshold level for carcinogenicity; however, most of the experimental studies indicate the existence of a threshold level. Therefore, CSFs developed by USEPA represent upper bound estimates. Carcinogenic risks generated in this assessment should be regarded as an upper bound estimate on the potential carcinogenic risks rather than an accurate representation of carcinogenic risk. The true carcinogenic risk is likely to be less than the predicted value (USEPA, 1989). Uncertainty is also associated with the application of the MMOA for the carcinogenic PAHs; this may overestimate or underestimate risks. Additionally, the generic ADAFs were used in the MMOA calculations, as there are no carcinogenic PAH-specific ADAFs available.

Additional uncertainty is in the prediction of relative sensitivities of different species of animals and the applicability of animal data to humans.

There is a high degree of uncertainty associated with the oral to dermal adjustment factors (based on constituent-specific GI absorption factors) used to transform the oral RfDs and CSFs based on administered doses to dermal RfDs and CSFs based on absorbed doses. It is not known if the adjustment factor results in an underestimation or overestimation of the actual toxicity associated with dermal exposure.

6.5.4 Uncertainty in Risk Characterization

The uncertainties identified in each component of risk assessment ultimately contribute to uncertainty in risk characterization. The addition of risks and HIs across pathways and constituents contributes to uncertainty based on chemical interactions such as additivity, synergism, potentiation, and susceptibility of exposed receptors.

6.6 Human Health Risk Summary

The HHRA was conducted to evaluate the potential human health risks associated with groundwater and soil at Site 24. This baseline risk assessment was conducted to characterize potential current and future human health risks on the basis of potential and unlikely (but conservative) receptor populations and exposure scenarios if no remedial action is implemented.

Appendix L, Tables 9.1.RME through 9.10.RME and Tables 9.1.CTE through 9.6.CTE summarize the RME and CTE potential hazards and risks to each receptor as described in **Section 6.4.2**. **Appendix L**, Tables 10.1.RME through 10.6.RME and 10.1.CTE, show the receptor scenarios with a total HI greater than 1.0 or total carcinogenic risks greater than 10^{-4}. Constituents that contribute HIs greater than 0.1 or carcinogenic risks greater than 10^{-6} are included in the table. These constituents are considered the COCs for the media and site. The noncarcinogenic hazards and carcinogenic risks are summarized in Tables 6-3 through 6-6. The primary risks drivers and COCs are summarized as follows.

6.6.1 Groundwater

- There is no current complete pathway for contact with groundwater. There are no unacceptable risks to future residents or industrial workers exposed via potable use of shallow or deep aquifer groundwater.

Future direct contact with shallow groundwater by construction workers would also not result in any potentially unacceptable noncarcinogenic hazards or carcinogenic risks.

6.6.2 Soil-Outside of the Waste Areas

- For current land use, exposure to surface soil at Site 24 does not pose unacceptable health risks to any receptor (adult or adolescent trespasser/visitor or industrial worker [conservative representative of military personnel]).
- For future industrial use, exposure to combined surface and subsurface soil at Site 24 does not pose unacceptable health risks to the any receptors (adult or adolescent trespasser/visitor, industrial worker, or construction worker) evaluated.
- For future residential use;
  - Site 24 does not pose unacceptable health risks to the adult or child resident associated with exposure to soil. Although the future child resident's total HI was greater than 1 (HI = 2), when this is segregated by the target organ/critical effect, each HI is less than the USEPA's threshold of 1.
  - Exposure by future lifetime residents (children + adults) could result in potentially unacceptable risk associated with exposure to hexavalent chromium in soil (2×10^{-4}). However, site analytical data reflect total chromium and were not speciated to determine trivalent verses hexavalent chromium. Trivalent chromium is most prevalent in the environment and is expected to reflect the majority of the total chromium concentration. Because trivalent chromium is not considered a potential carcinogen and trivalent chromium is the more prevalent form in the environment, the cancer risks (2×10^{-4}) based on hexavalent chromium is a conservative overestimate of risk. Furthermore if the total chromium is assumed to be trivalent the lifetime resident cancer risk is within the USEPA acceptable risk range (6×10^{-5}). Additionally, chromium concentrations in soil at Site 24 are consistent with background soils.

6.6.3 Soil Within the Waste Areas

- For current land use, there were no potentially unacceptable risks to receptors exposed to surface soil (adult or adolescent trespasser/visitor, or industrial worker). The HI for the industrial worker was equal to 1, and when this was segregated by target organ/critical effect, all HIs were less than the USEPA's target of 1.
- For future industrial use, exposure to combined surface and subsurface soil could pose potentially unacceptable health hazards for exposed construction workers (HI = 4). There are no potentially unacceptable risks for future adult or adolescent trespasser/visitor to site exposed to soils. Although the future industrial worker's total HI was greater than 1 (HI = 2), when this is segregated by the target organ/critical effect, each HI is less than the USEPA's target of 1.
- For future residential use;
  - Combined surface and subsurface soil at Site 24 does not pose unacceptable health risks to the adult resident. Although the future adult resident's total HI was greater than 1, when this is segregated by the target organ/critical effect, each HI is less than the USEPA's target of 1.
  - Within the waste areas of Site 24, exposure by child (HI = 21) and lifetime residents (CR = 3×10^{-4}) to combined surface and subsurface soil could result in potentially unacceptable risk associated with exposure to Aroclor-1254, aluminum, cadmium, chromium, and copper in soil.

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Surface Soil Inside Waste Area				
Surface Soil	11/6/1994	A06SS06	A06SS06-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS08	A06SS08-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS08	A06SS08D-00[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP01	A06TP01-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/17/1994	A06TP03	A06TP03-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP04	A06TP04-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP05	A06TP05-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS14	YS24-SS14-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS15	YS24-SS15-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS20	YS24-SS20-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
Surface Soil Outside Waste Area (not including sludge samples)				
Surface Soil	9/9/1997	24SS01	24SS01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS02	24SS02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS03	24SS03	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS03	24SS03D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS04	24SS04	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS05	24SS05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS07	A06SS07-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS09	A06SS09-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS10	A06SS10-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS11	A06SS11-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS12	A06SS12-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS12	A06SS12-00D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS13	A06SS13-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS14	A06SS14-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS15	A06SS15-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS16	A06SS16-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS17	A06SS17-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO04	YS24-SS04-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO05	YS24-SS05-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO06	YS24-SS06-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/19/2010	YS24-GW/SO07	YS24-SS07-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO08	YS24-SS08-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-GW/SO01	YS24-SS01-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-GW/SO01	YS24-SS01P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-GW/SO02	YS24-SS02-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO03	YS24-SS03-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS11	YS24-SS11-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS11	YS24-SS11P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Surface Soil Outside Waste Area (not including sludge samples)				
Surface Soil	4/16/2010	YS24-SS12	YS24-SS12-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
(cont'd)	4/16/2010	YS24-SS13	YS24-SS13-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS16	YS24-SS16-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS17	YS24-SS17-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS18	YS24-SS18-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS19	YS24-SS19-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS22	YS24-SS22-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS21	YS24-SS21-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS23	YS24-SS23-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS24	YS24-SS24-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS25	YS24-SS25-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS26	YS24-SS26-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS26	YS24-SS26P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS27	YS24-SS27-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS28	YS24-SS28-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS29	YS24-SS29-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS30	YS24-SS30-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS31	YS24-SS31-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
Surface Soil Across Site (not including sludge samples)				
Surface Soil	9/9/1997	24SS01	24SS01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS02	24SS02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS03	24SS03	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS03	24SS03D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS04	24SS04	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS05	24SS05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS06	A06SS06-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS07	A06SS07-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS08	A06SS08-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS08	A06SS08D-00[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS09	A06SS09-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS10	A06SS10-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS11	A06SS11-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS12	A06SS12-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS12	A06SS12-00D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS13	A06SS13-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS14	A06SS14-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS15	A06SS15-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS16	A06SS16-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS17	A06SS17-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP01	A06TP01-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Surface Soil Across Site (not including sludge samples)				
Surface Soil	11/17/1994	A06TP03	A06TP03-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
(cont'd)	11/15/1994	A06TP04	A06TP04-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP05	A06TP05-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO04	YS24-SS04-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO05	YS24-SS05-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO06	YS24-SS06-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/19/2010	YS24-GW/SO07	YS24-SS07-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO08	YS24-SS08-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-GW/SO01	YS24-SS01-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-GW/SO01	YS24-SS01P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-GW/SO02	YS24-SS02-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO03	YS24-SS03-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS11	YS24-SS11-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS11	YS24-SS11P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS12	YS24-SS12-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS13	YS24-SS13-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS14	YS24-SS14-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS15	YS24-SS15-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS16	YS24-SS16-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS17	YS24-SS17-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS18	YS24-SS18-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS19	YS24-SS19-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS20	YS24-SS20-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS22	YS24-SS22-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS21	YS24-SS21-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS23	YS24-SS23-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS24	YS24-SS24-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS25	YS24-SS25-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS26	YS24-SS26-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS26	YS24-SS26P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS27	YS24-SS27-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS28	YS24-SS28-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS29	YS24-SS29-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS30	YS24-SS30-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS31	YS24-SS31-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
Soil* in Sludge Area				
Soil*	4/19/2010	YS24-GW/SB09	YS24-SB09-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/19/2010	YS24-SS09	YS24-SS09-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SS10	YS24-SS10-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Soil* in Waste Area				
Soil*	11/6/1994	A06SS06	A06SS06-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS08	A06SS08-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS08	A06SS08D-00[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP01	A06TP01-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP01	A06TP01-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP02	A06TP02-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP02	A06TP02-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/17/1994	A06TP03	A06TP03-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/17/1994	A06TP03	A06TP03-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP04	A06TP04-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP04	A06TP04-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP05	A06TP05-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP05	A06TP05-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP06	A06TP06-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP06	A06TP06-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/22/2010	YS24-SB121	YS24-SB121-0410-SO	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB14	YS24-SB14-10-11-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB15	YS24-SB15-7-8-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB20	YS24-SB20-7-8-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB20B	YS24-SB20B-7-8-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS14	YS24-SS14-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS15	YS24-SS15-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS20	YS24-SS20-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
Soil* Outside of Waste Area (not including sludge samples)				
Soil*	9/9/1997	24SS01	24SS01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS02	24SS02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS03	24SS03	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS03	24SS03D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS04	24SS04	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS05	24SS05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06SB03	A06SB03-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06SB03	A06SB03-01D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06SB03	A06SB03-07	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06SB03	A06SB03-05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/4/1994	A06SB04	A06SB04-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/4/1994	A06SB04	A06SB04-08	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Soil* Outside of Waste Area (not including sludge samples)				
Soil*	11/4/1994	A06SB04	A06SB04-05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
(cont'd)	11/8/1994	A06SB05	A06SB05-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB05	A06SB05-06	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB05	A06SB05-05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB05	A06SB05-05D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SB06	A06SB06-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SB06	A06SB06-06	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SB06	A06SB06-04	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SB06	A06SB06-04D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB10	A06SB10-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB10	A06SB10-07	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB10	A06SB10-05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS07	A06SS07-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS09	A06SS09-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS10	A06SS10-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS11	A06SS11-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS12	A06SS12-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS12	A06SS12-00D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS13	A06SS13-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS14	A06SS14-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS15	A06SS15-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS16	A06SS16-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS17	A06SS17-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO04	YS24-SS04-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO04	YS24-SB04-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO05	YS24-SS05-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO05	YS24-SB05-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO06	YS24-SS06-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO06	YS24-SB06-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/19/2010	YS24-GW/SO07	YS24-SS07-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/19/2010	YS24-GW/SO07	YS24-SB07-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO08	YS24-SS08-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO08	YS24-SB08-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB10	YS24-SB10-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB11	YS24-SB11-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB12	YS24-SB12-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB12	YS24-SB12P-5-6-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB13	YS24-SB13-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB16	YS24-SB16-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB17	YS24-SB17-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB18	YS24-SB18-7-8-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB19	YS24-SB19-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Soil* Outside of Waste Area (not including sludge samples)				
Soil*	4/16/2010	YS24-SO01	YS24-SS01-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
(cont'd)	4/16/2010	YS24-SO01	YS24-SS01P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO01	YS24-SB01-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO02	YS24-SS02-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO02	YS24-SB02-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO02	YS24-SB02P-0_5-2-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO03	YS24-SS03-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO03	YS24-SB03-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS11	YS24-SS11-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS11	YS24-SS11P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS12	YS24-SS12-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS13	YS24-SS13-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS16	YS24-SS16-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS17	YS24-SS17-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS18	YS24-SS18-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS19	YS24-SS19-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS21	YS24-SS21-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS22	YS24-SS22-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS23	YS24-SS23-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS24	YS24-SS24-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS25	YS24-SS25-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS26	YS24-SS26-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS26	YS24-SS26P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS27	YS24-SS27-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS28	YS24-SS28-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS29	YS24-SS29-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS30	YS24-SS30-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS31	YS24-SS31-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
Soil* Across Site (not including sludge samples)				
Soil*	9/9/1997	24SS01	24SS01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS02	24SS02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS03	24SS03	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS03	24SS03D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS04	24SS04	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	9/9/1997	24SS05	24SS05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06SB03	A06SB03-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06SB03	A06SB03-01D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06SB03	A06SB03-07	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06SB03	A06SB03-05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/4/1994	A06SB04	A06SB04-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/4/1994	A06SB04	A06SB04-08	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Soil* Across Site (not including sludge samples)				
Soil*	11/4/1994	A06SB04	A06SB04-05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
(cont'd)	11/8/1994	A06SB05	A06SB05-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB05	A06SB05-06	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB05	A06SB05-05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB05	A06SB05-05D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SB06	A06SB06-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SB06	A06SB06-06	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SB06	A06SB06-04	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SB06	A06SB06-04D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB10	A06SB10-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB10	A06SB10-07	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/8/1994	A06SB10	A06SB10-05	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS06	A06SS06-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS07	A06SS07-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS08	A06SS08-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/6/1994	A06SS08	A06SS08D-00[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS09	A06SS09-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS10	A06SS10-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS11	A06SS11-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS12	A06SS12-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS12	A06SS12-00D[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS13	A06SS13-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS14	A06SS14-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS15	A06SS15-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS16	A06SS16-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/7/1994	A06SS17	A06SS17-00	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP01	A06TP01-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP01	A06TP01-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP02	A06TP02-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/16/1994	A06TP02	A06TP02-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/17/1994	A06TP03	A06TP03-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/17/1994	A06TP03	A06TP03-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP04	A06TP04-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP04	A06TP04-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP05	A06TP05-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP05	A06TP05-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP06	A06TP06-01	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	11/15/1994	A06TP06	A06TP06-02	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO04	YS24-SS04-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO04	YS24-SB04-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO05	YS24-SS05-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO05	YS24-SB05-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO06	YS24-SS06-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Soil* Across Site (not including sludge samples)				
Soil*	4/15/2010	YS24-GW/SO06	YS24-SB06-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
(cont'd)	4/19/2010	YS24-GW/SO07	YS24-SS07-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/19/2010	YS24-GW/SO07	YS24-SB07-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO08	YS24-SS08-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-GW/SO08	YS24-SB08-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB10	YS24-SB10-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB11	YS24-SB11-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB12	YS24-SB12-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB12	YS24-SB12P-5-6-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/22/2010	YS24-SB121	YS24-SB121-0410-SO	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB13	YS24-SB13-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB14	YS24-SB14-10-11-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB15	YS24-SB15-7-8-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/21/2010	YS24-SB16	YS24-SB16-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB17	YS24-SB17-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB18	YS24-SB18-7-8-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB19	YS24-SB19-5-6-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB20	YS24-SB20-7-8-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/20/2010	YS24-SB20B	YS24-SB20B-7-8-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO01	YS24-SS01-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO01	YS24-SS01P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO01	YS24-SB01-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO02	YS24-SS02-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO02	YS24-SB02-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO02	YS24-SB02P-0_5-2-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO03	YS24-SS03-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SO03	YS24-SB03-0_5-2-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS11	YS24-SS11-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS11	YS24-SS11P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS12	YS24-SS12-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS13	YS24-SS13-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS14	YS24-SS14-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS15	YS24-SS15-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS16	YS24-SS16-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS17	YS24-SS17-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS18	YS24-SS18-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS19	YS24-SS19-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/15/2010	YS24-SS20	YS24-SS20-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/16/2010	YS24-SS21	YS24-SS21-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS22	YS24-SS22-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS23	YS24-SS23-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS24	YS24-SS24-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS25	YS24-SS25-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs

TABLE 6-1

Summary of Data Quantitatively Used in HHRA

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Medium	Date of Sampling	Sample Location	Sample	Parameters
Soil* Across Site (not including sludge samples)				
Soil*	4/14/2010	YS24-SS26	YS24-SS26-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
(cont'd)	4/14/2010	YS24-SS26	YS24-SS26P-0410[1]	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS27	YS24-SS27-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS28	YS24-SS28-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS29	YS24-SS29-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS30	YS24-SS30-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
	4/14/2010	YS24-SS31	YS24-SS31-0410	VOCs, SVOCs, Pesticides, Total Metals, Explosives, PCBs
Shallow Aquifer Groundwater				
Groundwater	6/15/2010	YS24-GW/SB09	YS24-GW09S-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/16/2010	YS24-GW/SO04	YS24-GW04S-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/16/2010	YS24-GW/SO05	YS24-GW05S-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/16/2010	YS24-GW/SO06	YS24-GW06S-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/16/2010	YS24-GW/SO07	YS24-GW07S-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/15/2010	YS24-GW/SO08	YS24-GW08S-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/16/2010	YS24-GW03	YS24-GW03S-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/16/2010	YS24-GW03	YS24-GW03SP-0610[1]	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/16/2010	YS24-GW10	YS24-GW10S-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
Deep Aquifer Groundwater				
Groundwater	6/15/2010	YS24-GW01	YS24-GW01D-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives
	6/15/2010	YS24-GW02	YS24-GW02D-0610	VOCs, SVOCs, Pesticides/PCBs, Total Metals, Dissolved Metals, Explosives

Notes:

Soil* = combined soil and subsurface soil

VOCs - Volatile organic constituents

SVOCs - Semi-volatile organic constituents

[1] Duplicate of sample listed above.

TABLE 6-2

Summary of Constituents of Potential Concern for the Baseline Risk Assessment

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Surface Soil in Waste Area	
Benzo(a)pyrene	Arsenic
Benzo(b)fluoranthene	Cadmium
Benzo(k)fluoranthene	Chromium
Aroclor-1254	Cobalt
Aluminum	Iron
Emissions from Surface Soil in Waste Area	
Chromium	
Surface Soil Across Site	
Benzo(a)anthracene	Aluminum
Benzo(a)pyrene	Arsenic
Benzo(b)fluoranthene	Cadmium
Benzo(k)fluoranthene	Chromium
Chrysene	Cobalt
Dibenz(a,h)anthracene	Iron
Indeno(1,2,3-cd)pyrene	Manganese
Aroclor-1254	Mercury
Emissions from Surface Soil Across Site	
Chromium	
Surface Soil Outside of Waste Area	
Benzo(a)anthracene	Aluminum
Benzo(a)pyrene	Arsenic
Benzo(b)fluoranthene	Chromium
Benzo(k)fluoranthene	Cobalt
Chrysene	Iron
Dibenz(a,h)anthracene	Manganese
Indeno(1,2,3-cd)pyrene	Mercury
Emissions from Surface Soil Outside Waste Area	
Chromium	
Soil* in Sludge Area	
Chromium	Iron
Cobalt	Manganese

TABLE 6-2

Summary of Constituents of Potential Concern for the Baseline Risk Assessment

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Soil* in Waste Area	
2,4-Dinitrotoluene	Heptachlor
Benzo(a)anthracene	2,4,6-Trinitrotoluene
Benzo(a)pyrene	Aluminum
Benzo(b)fluoranthene	Arsenic
Benzo(k)fluoranthene	Cadmium
Chrysene	Chromium
n-Nitroso-di-n-propylamine	Cobalt
alpha-BHC	Copper
Aroclor-1254	Iron
Aroclor-1260	Manganese
Dieldrin	Vanadium
Emissions from Soil* in the Waste Area	
Chromium	
Soil* Across Site	
2,4-Dinitrotoluene	Heptachlor
Benzo(a)anthracene	2,4,6-Trinitrotoluene
Benzo(a)pyrene	Aluminum
Benzo(b)fluoranthene	Antimony
Benzo(k)fluoranthene	Arsenic
Chrysene	Cadmium
Dibenz(a,h)anthracene	Chromium
Indeno(1,2,3-cd)pyrene	Cobalt
n-Nitroso-di-n-propylamine	Copper
alpha-BHC	Iron
Aroclor-1254	Manganese
Aroclor-1260	Mercury
Dieldrin	Vanadium
Emissions from Soil* Across Site	
Chromium	
Soil* Outside of Waste Area	
Benzo(a)anthracene	Antimony
Benzo(a)pyrene	Arsenic
Benzo(b)fluoranthene	Chromium
Benzo(k)fluoranthene	Cobalt
Chrysene	Iron
Dibenz(a,h)anthracene	Manganese
Indeno(1,2,3-cd)pyrene	Mercury
Aluminum	Vanadium
Emissions from Soil* Outside Waste Area	
Chromium	

TABLE 6-2

Summary of Constituents of Potential Concern for the Baseline Risk Assessment

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Groundwater - Shallow Aquifer	
Heptachlor epoxide	RDX
Groundwater - Deep Aquifer	
Heptachlor epoxide	Manganese

Soil* is combined surface and subsurface soil

TABLE 6-3

Summary of RME Cancer Risks and Hazard Indices

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Current/Future Trespasser/Visitor Adult	Surface Soil in Waste Area	Ingestion	9E-07				0.2	
		Dermal Contact	8E-07				0.03	
		Inhalation	7E-09				0.000002	
		Total	2E-06				0.2	
	Surface Soil Across Site	Ingestion	3E-06			Arsenic	0.05	
		Dermal Contact	9E-07				0.01	
		Inhalation	5E-09				0.000002	
		Total	4E-06			Arsenic	0.06	
	Surface Soil Outside Waste Area	Ingestion	3E-06			Arsenic	0.02	
		Dermal Contact	9E-07				0.003	
		Inhalation	5E-09				0.000002	
		Total	4E-06			Arsenic	0.03	
	Soil* in Sludge Area	Ingestion	2E-07				0.008	
		Dermal Contact	4E-07				0.001	
		Inhalation	NA				NA	
		Total	6E-07				0.009	
Current/Future Trespasser/Visitor Adolescent	Surface Soil in Waste Area	Ingestion	5E-07				0.2	
		Dermal Contact	1E-06				0.1	
		Inhalation	2E-09				0.000002	
		Total	2E-06				0.4	
	Surface Soil Across Site	Ingestion	1E-06				0.07	
		Dermal Contact	1E-06				0.04	
		Inhalation	2E-09				0.000002	
		Total	3E-06				0.1	
	Surface Soil Outside Waste Area	Ingestion	2E-06				0.03	
		Dermal Contact	1E-06				0.01	
		Inhalation	2E-09				0.000002	
		Total	3E-06			Arsenic	0.05	
	Soil* in Sludge Area	Ingestion	1E-07				0.01	
		Dermal Contact	6E-07				0.004	
		Inhalation	NA				NA	
		Total	7E-07				0.02	
Current/Future Industrial Worker Adult	Surface Soil in Waste Area	Ingestion	5E-06			Arsenic, Chromium	0.8	
		Dermal Contact	7E-06			Chromium	0.2	
		Inhalation	7E-08				0.00002	
		Total	1E-05			Arsenic, Chromium	1	
	Surface Soil Across Site	Ingestion	1E-05			Arsenic, Chromium	0.2	
		Dermal Contact	8E-06			Arsenic, Chromium	0.08	
		Inhalation	5E-08				0.00002	
		Total	2E-05			Arsenic, Chromium	0.3	
	Surface Soil Outside Waste Area	Ingestion	2E-05			Arsenic, Chromium	0.1	
		Dermal Contact	8E-06			Arsenic, Chromium	0.03	
		Inhalation	5E-08				0.00002	
		Total	2E-05		Arsenic	Chromium	0.1	
	Soil* in Sludge Area	Ingestion	1E-06				0.04	
		Dermal Contact	3E-06			Chromium	0.008	
		Inhalation	NA				NA	
		Total	4E-06			Chromium	0.05	

TABLE 6-3

Summary of RME Cancer Risks and Hazard Indices

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Adult Resident	Soil* in Waste Area	Ingestion	NA				2	
		Dermal Contact	NA				0.6	
		Inhalation	NA				0.0001	
		Total	NA				2	
	Soil* Across Site	Ingestion	NA				0.5	
		Dermal Contact	NA				0.2	
		Inhalation	NA				0.0001	
		Total	NA				0.7	
	Soil* Outside Waste Area	Ingestion	NA				0.4	
		Dermal Contact	NA				0.02	
		Inhalation	NA				0.0001	
		Total	NA				0.4	
	Soil* in Sludge Area	Ingestion	NA				0.06	
		Dermal Contact	NA				0.007	
		Inhalation	NA				NA	
		Total	NA				0.06	
	Groundwater Shallow Aquifer	Ingestion	NA				0.07	
		Dermal Contact	NA				0.09	
		Inhalation	NA				NA	
		Total	NA				0.2	
	Groundwater Deep aquifer	Ingestion	NA				0.1	
		Dermal Contact	NA				0.05	
		Inhalation	NA				NA	
		Total	NA				0.2	
	All Media[1]	Total	NA				3	
Future Child Resident	Soil* in Waste Area	Ingestion	NA				18	Aroclor-1254, Cadmium, Copper
		Dermal Contact	NA				4	Aroclor-1254
		Inhalation	NA				0.0001	
		Total	NA				21	Aroclor-1254, Cadmium, Copper
	Soil* Across Site	Ingestion	NA				5	Aroclor-1254
		Dermal Contact	NA				1	
		Inhalation	NA				0.0001	
		Total	NA				6	Aroclor-1254
	Soil* Outside Waste Area	Ingestion	NA				1	
		Dermal Contact	NA				0.2	
		Inhalation	NA				0.0001	
		Total	NA				2	
	Soil* in Sludge Area	Ingestion	NA				0.5	
		Dermal Contact	NA				0.05	
		Inhalation	NA				NA	
		Total	NA				0.6	
	Groundwater Shallow Aquifer	Ingestion	NA				0.2	
		Dermal Contact	NA				0.2	
		Inhalation	NA				NA	
		Total	NA				0.4	
	Groundwater Deep aquifer	Ingestion	NA				0.3	
		Dermal Contact	NA				0.1	
		Inhalation	NA				NA	
		Total	NA				0.5	
	All Media[1]	Total	NA				22	

TABLE 6-3

Summary of RME Cancer Risks and Hazard Indices

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future	Soil* in Waste Area	Ingestion	1E-04		Aroclor-1254, Chromium	Benzo(a)pyrene, alpha-BHC, Aroclor-1260, Arsenic	NA	
Child/Adult Resident		Dermal Contact	1E-04		Aroclor-1254, Chromium		NA	
		Inhalation	1E-06				NA	
		Total	3E-04	Chromium	Aroclor-1254	Benzo(a)pyrene, alpha-BHC, Aroclor-1260, Arsenic	NA	
	Soil* Across Site	Ingestion	1E-04		Arsenic, Chromium	Benzo(a)pyrene, Dibenz(a,h)anthracene, Aroclor-1254	NA	
		Dermal Contact	1E-04		Chromium	Benzo(a)pyrene, Aroclor-1254, Arsenic	NA	
		Inhalation	1E-06				NA	
		Total	2E-04		Arsenic, Chromium	Benzo(a)pyrene, Dibenz(a,h)anthracene, Aroclor-1254	NA	
	Soil* Outside	Ingestion	1E-04		Arsenic, Chromium	Benzo(a)pyrene, Dibenz(a,h)anthracene	NA	
	Waste Area	Dermal Contact	8E-05		Chromium	Benzo(a)pyrene, Arsenic	NA	
		Inhalation	9E-07				NA	
		Total	2E-04		Arsenic, Chromium	Benzo(a)pyrene, Dibenz(a,h)anthracene	NA	
	Soil* in Sludge Area	Ingestion	2E-05		Chromium		NA	
		Dermal Contact	4E-05		Chromium		NA	
		Inhalation	NA				NA	
		Total	6E-05		Chromium		NA	
	Groundwater	Ingestion	7E-06			Heptachlor epoxide, RDX	NA	
	Shallow Aquifer	Dermal Contact	6E-06			Heptachlor epoxide	NA	
		Inhalation	NA				NA	
		Total	1E-05			Heptachlor epoxide, RDX	NA	
	Groundwater	Ingestion	1E-06				NA	
	Deep aquifer	Dermal Contact	2E-06			Heptachlor epoxide	NA	
		Inhalation	NA				NA	
		Total	3E-06			Heptachlor epoxide	NA	
	All Media[1]	Total	3E-04				NA	

TABLE 6-3

Summary of RME Cancer Risks and Hazard Indices

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future	Soil* in Waste Area	Ingestion	1E-06				4	
Construction Worker		Dermal Contact	6E-07				0.4	
Adult		Inhalation	2E-09				0.00002	
		Total	2E-06				4	
	Soil* Across Site	Ingestion	1E-06				0.9	
		Dermal Contact	4E-07				0.1	
		Inhalation	2E-09				0.00001	
		Total	2E-06				1	
	Soil* Outside	Ingestion	1E-06				0.2	
	Waste Area	Dermal Contact	3E-07				0.4	
		Inhalation	1E-09				0.00001	
		Total	2E-06				0.6	
	Soil* in Sludge Area	Ingestion	1E-07				0.03	
		Dermal Contact	1E-07				0.001	
		Inhalation	NA				NA	
		Total	2E-07				0.03	
	Groundwater	Ingestion	NA				NA	
	Shallow Aquifer	Dermal Contact	6E-08				0.04	
		Inhalation	NA				NA	
		Total	6E-08				0.04	
	All Media[1]	Total	2E-06				4	
Future	Soil* in Waste Area	Ingestion	2E-05			Aroclor-1254, Arsenic, Chromium	1	
Industrial Worker		Dermal Contact	2E-05			Aroclor-1254, Chromium	0.7	
Adult		Inhalation	1E-07				0.00004	
		Total	3E-05		Aroclor-1254	Arsenic, Chromium	2	
	Soil* Across Site	Ingestion	1E-05			Aroclor-1254, Arsenic, Chromium	0.4	
		Dermal Contact	1E-05			Aroclor-1254, Arsenic, Chromium	0.2	
		Inhalation	9E-08				0.00003	
		Total	3E-05			Aroclor-1254, Arsenic, Chromium	0.6	
	Soil* Outside	Ingestion	1E-05			Arsenic, Chromium	0.1	
	Waste Area	Dermal Contact	9E-06			Arsenic, Chromium	0.03	
		Inhalation	7E-08				0.00002	
		Total	2E-05			Arsenic, Chromium	0.1	
	Groundwater	Ingestion	2E-06				0.03	
	Shallow Aquifer	Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	2E-06				0.03	
	Groundwater	Ingestion	3E-07				0.05	
	Deep aquifer	Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	3E-07				0.05	
	All Media[1]	Total	4E-05				2	

TABLE 6-3

Summary of RME Cancer Risks and Hazard Indices

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Trespasser/Visitor Adult	Soil* in Waste Area	Ingestion	3E-06			Aroclor-1254	0.3	
		Dermal Contact	2E-06				0.09	
		Inhalation	1E-08				0.000004	
		Total	5E-06			Aroclor-1254	0.4	
	Soil* Across Site	Ingestion	3E-06			Arsenic	0.1	
		Dermal Contact	2E-06				0.02	
		Inhalation	9E-09				0.000003	
		Total	5E-06			Arsenic, Chromium	0.1	
	Soil* Outside Waste Area	Ingestion	3E-06			Arsenic	0.02	
		Dermal Contact	1E-06				0.004	
		Inhalation	7E-09				0.000002	
		Total	4E-06			Arsenic	0.03	
Future Trespasser/Visitor Adolescent	Soil* in Waste Area	Ingestion	2E-06				0.4	
		Dermal Contact	3E-06			Chromium	0.3	
		Inhalation	4E-09				0.000004	
		Total	5E-06			Aroclor-1254, Chromium	0.7	
	Soil* Across Site	Ingestion	2E-06				0.2	
		Dermal Contact	2E-06				0.1	
		Inhalation	3E-09				0.000003	
		Total	4E-06			Chromium	0.3	
	Soil* Outside Waste Area	Ingestion	1E-06				0.03	
		Dermal Contact	2E-06				0.01	
		Inhalation	3E-09				0.000002	
		Total	3E-06				0.05	

Soil* - surface soil and subsurface soil combined.

[1] Total is maximum of soil (in waste area, across site, outside waste area, or sludge area) and groundwater (shallow or deep), where applicable.

TABLE 6-4

Summary of CTE Cancer Risks and Hazard Indices

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks >10^{-4}	Chemicals with Cancer Risks >10^{-5} and <10^{-4}	Chemicals with Cancer Risks >10^{-6} and <10^{-5}	Hazard Index	Chemicals with HI>1
Current/Future Industrial Worker Adult	Surface Soil in Waste Area	Ingestion	7E-07				0.4	
		Dermal Contact	2E-07				0.02	
		Inhalation	NA				NA	
		Total	9E-07				0.4	
	All Media	Total	9E-07				0.4	
Future Adult Resident	Soil* in Waste Area	Ingestion	NA				0.6	
		Dermal Contact	NA				0.06	
		Inhalation	NA				NA	
		Total	NA				0.7	
	Groundwater Deep aquifer	Ingestion	NA				0.07	
		Dermal Contact	NA				0.02	
		Inhalation	NA				NA	
		Total	NA				0.09	
	All Media[1]	Total	NA				0.8	
Future Child Resident	Soil* in Waste Area	Ingestion	NA				6	Aroclor-1254, Cadmium
		Dermal Contact	NA				0.5	
		Inhalation	NA				NA	
		Total	NA				6	Aroclor-1254, Cadmium
	Soil* Outside Waste Area	Ingestion	NA				0.5	
		Dermal Contact	NA				0.02	
		Inhalation	NA				NA	
		Total	NA				0.5	
	Soil* Across Site	Ingestion	NA				2	
		Dermal Contact	NA				0.1	
		Inhalation	NA				NA	
		Total	NA				2	
	Groundwater Deep aquifer	Ingestion	NA				0.2	
		Dermal Contact	NA				0.04	
		Inhalation	NA				NA	
		Total	NA				0.3	
	All Media[1]	Total	NA				7	

TABLE 6-4

Summary of CTE Cancer Risks and Hazard Indices

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks >10^{-4}	Chemicals with Cancer Risks >10^{-5} and <10^{-4}	Chemicals with Cancer Risks >10^{-6} and <10^{-5}	Hazard Index	Chemicals with HI>1
Future	Soil* in Waste Area	Ingestion	4E-05		Chromium	Aroclor-1254, Arsenic	NA	
Child/Adult Resident		Dermal Contact	2E-05			Aroclor-1254, Chromium	NA	
		Inhalation	7E-07				NA	
		Total	5E-05		Chromium	Aroclor-1254, Arsenic	NA	
	Soil* Outside Waste Area	Ingestion	3E-05			Benzo(a)pyrene, Arsenic, Chromium	NA	
		Dermal Contact	9E-06			Chromium	NA	
		Inhalation	NA				NA	
		Total	4E-05		Chromium	Benzo(a)pyrene, Arsenic	NA	
	Soil* Across Site	Ingestion	4E-05		Chromium	Benzo(a)pyrene, Aroclor-1254, Arsenic	NA	
		Dermal Contact	1E-05			Chromium	NA	
		Inhalation	NA				NA	
		Total	5E-05		Chromium	Benzo(a)pyrene, Aroclor-1254, Arsenic	NA	
	Groundwater Shallow Aquifer	Ingestion	2E-06				NA	
		Dermal Contact	3E-07				NA	
		Inhalation	NA				NA	
		Total	3E-06			Heptachlor epoxide	NA	
	All Media[1]	Total	6E-05				NA	
Future Construction Worker Adult	Soil* in Waste Area	Ingestion	3E-07				0.8	
		Dermal Contact	6E-08				0.02	
		Inhalation	NA				NA	
		Total	4E-07				0.8	
	Groundwater Shallow Aquifer	Ingestion	NA				NA	
		Dermal Contact	5E-08				0.03	
		Inhalation	NA				NA	
		Total	5E-08				0.03	
	All Media	Total	4E-07				0.8	
Future Industrial Worker Adult	Soil* in Waste Area	Ingestion	2E-06				0.6	
		Dermal Contact	6E-07				0.06	
		Inhalation	NA				NA	
		Total	3E-06			Aroclor-1254	0.6	
	All Media[1]	Total	3E-06				0.6	

Soil* - surface soil and subsurface soil combined.

[1] Total is maximum of soil (in waste area, across site, outside waste area, or sludge area) and groundwater (shallow or deep), where applicable.

TABLE 6-5

Summary of RME Non-Cancer Hazards

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

	Trespasser/Visitor		Industrial	Resident		COC	Construction
Exposure Scenario (Non-Cancer Hazards)	**Adult HI**	**Adolescent HI**	**Worker HI**	**Adult HI**	**Child HI**	**(Chemicals of Concern)**	**Worker HI**
Waste Area Soil & Shallow Groundwater Total	0.4	0.7	2	3	22		4
Waste Area Soil	0.4	0.7	2	2	21	Aroclor-1254, Aluminum, Cadmium, Chromium, Cobalt, Copper, Iron	4
Shallow Groundwater	NA	NA	0.03	0.2	0.4		0.04
Waste Area Soil & Deep Groundwater Total	0.4	0.7	2	3	22		4
Waste Area Soil	0.4	0.7	2	2	21	Aroclor-1254, Aluminum, Cadmium, Chromium, Cobalt, Copper, Iron	4
Deep Groundwater	NA	NA	0.05	0.2	0.5		NA
Soil Outside Waste Area & Shallow Groundwater Total	0.03	0.05	0.2	0.6	2		0.7
Outside Waste Area Soil	0.03	0.05	0.1	0.4	2	NA*	0.6
Shallow Groundwater	NA	NA	0.03	0.2	0.4		0.04
Soil Outside Waste Area & Deep Groundwater Total	0.03	0.05	0.2	0.6	2		0.6
Outside Waste Area Soil	0.03	0.05	0.1	0.4	2	NA*	0.6
Deep Groundwater	NA	NA	0.05	0.2	0.5		NA
Site-Wide Soil & Shallow Groundwater Total	0.1	0.3	0.6	0.9	6		1
Site-Wide Soil	0.1	0.3	0.6	0.7	6	Aroclor-1254, Aluminum, Arsenic, Cadmium, Chromium, Copper, Iron	1
Shallow Groundwater	NA	NA	0.03	0.2	0.4		0.04
Site-Wide Soil & Deep Groundwater Total	0.1	0.3	0.6	0.9	7		1
Site-Wide Soil	0.1	0.3	0.6	0.7	6	Aroclor-1254, Aluminum, Arsenic, Cadmium, Chromium, Copper, Iron	1
Deep Groundwater	NA	NA	0.03	0.2	0.5		NA
Soils in Sludge Area & Shallow Groundwater Total	0.009	0.02	0.08	0.2	1		0.07
Sludge Area Soil	0.009	0.02	0.05	0.06	0.6	NA*	0.03
Shallow Groundwater	NA	NA	0.03	0.2	0.4		0.04
Soils in Sludge Area & Deep Groundwater Total	0.009	0.02	0.1	0.3	1		0.03
Sludge Area Soil	0.009	0.02	0.05	0.06	0.6	NA*	0.03
Deep Groundwater	NA	NA	0.05	0.2	0.5		NA

NA = not available/not applicable

COC = any chemical that contributes an HI above 0.1 to a total cummulative HI above 1. The COCs shown are for the most conservative scenario.

HI = hazard index

*Although total HI above 1, no target organ/target effect HIs above 1, therefore, no COCs.

TABLE 6-6

Summary of RME Cancer Risks

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Exposure Scenario (Non-Cancer Hazards)		Trespasser/Visitor Adult CR	Trespasser/Visitor Adolescent CR	Industrial Worker CR	Resident CCRld/Adult CR	COCs (Chemicals of Concern)	Construction Worker CR
Waste Area Soils & Shallow Groundwater Total		5.E-06	5.E-06	4.E-05	3.E-04		2.E-06
	Waste Area Soil	5.E-06	5.E-06	3.E-05	3.E-04	Aroclor-1254, Aroclor-1260, Benzo(a)pyrene, alpha-BHC, Arsenic, Chromium	2.E-06
	Shallow Groundwater	NA	NA	2.E-06	1.E-05		6.E-08
Waste Area Soil & Deep Groundwater Total		5.E-06	5.E-06	4.E-05	3.E-04		2.E-06
	Waste Area Soil	5.E-06	5.E-06	3.E-05	3.E-04	Aroclor-1254, Aroclor-1260, Benzo(a)pyrene, alpha-BHC, Arsenic, Chromium	2.E-06
	Deep Groundwater	NA	NA	3.E-07	3.E-06		NA
Soil Outside Waste Area & Shallow Groundwater Total		4.E-06	3.E-06	2.E-05	2.E-04		2.E-06
	Outside Waste Area Soil	4.E-06	3.E-06	2.E-05	2.E-04	Benzo(a)pyrene, Dibenz(a,h)anthracene, Arsenic, Chromium	2.E-06
	Shallow Groundwater	NA	NA	2.E-06	1.E-05		6.E-08
Soil Outside Waste Area & Deep Groundwater Total		4.E-06	3.E-06	2.E-05	2.E-04		2.E-06
	Outside Waste Area Soil	4.E-06	3.E-06	2.E-05	2.E-04	Benzo(a)pyrene, Dibenz(a,h)anthracene, Arsenic, Chromium	2.E-06
	Deep Groundwater	NA	NA	3.E-07	3.E-06		NA
Site-Wide Soil & Shallow Groundwater Total		5.E-06	4.E-06	3.E-05	2.E-04		2.E-06
	Site-Wide Soil	5.E-06	4.E-06	3.E-05	2.E-04	Aroclor-1254, Benzo(a)pyrene, Dibenz(a,h)anthracene, Arsenic, Chromium	2.E-06
	Shallow Groundwater	NA	NA	2.E-06	1.E-05		NA
Site-Wide Soil & Deep Groundwater Total		5.E-06	4.E-06	3.E-05	2.E-04		2.E-06
	Site-Wide Soil	5.E-06	4.E-06	3.E-05	2.E-04		2.E-06
	Deep Groundwater	NA	NA	3.E-07	3.E-06		6.E-08
Soils in Sludge Area & Shallow Groundwater Total		6.E-07	7.E-07	6.E-06	7.E-05		3.E-07
	Sludge Area Soil	6.E-07	7.E-07	4.E-06	6.E-05	NA	2.E-07
	Shallow Groundwater	NA	NA	2.E-06	1.E-05		6.E-08
Soils in Sludge Area & Deep Groundwater Total		6.E-07	7.E-07	5.E-06	6.E-05		2.E-07
	Sludge Area Soil	6.E-07	7.E-07	4.E-06	6.E-05	NA	2.E-07
	Deep Groundwater	NA	NA	3.E-07	3.E-06		NA

CR = Cancer Risk

NA = not available/not applicable

COC = any chemical that contributes cancer risk above 10-6 to a total cummulative cancer risk above 10-4. The COCs shown are for the most conservative scenario.

SECTION 7

Ecological Risk Assessment

7.1 Introduction

This section contains a Screening-level Ecological Risk Assessment (SERA), constituting Steps 1 and 2 of the ERA process, and the first step (Step 3A) of a Baseline Ecological Risk Assessment (BERA) for Site 24.

7.1.1 Ecological Risk Assessment Process

This ERA was conducted in accordance with the *Navy Policy for Conducting Ecological Risk Assessments* (CNO, 1999) and the Navy guidance for implementing this ERA policy (NAVFAC, 2003). The Navy ERA policy and guidance, which describe a process consisting of eight steps organized into three tiers, are conceptually similar to the 8-step ERA process outlined in USEPA ERA guidance for the Superfund program (USEPA, 1997a). For both sets of guidance, Steps 1 and 2 involve conducting a SERA using very conservative assumptions. The BERA represents Steps 3 through 7. The BERA uses less conservative (but more realistic) assumptions and site-specific data to refine the risk estimates from the SERA for components that fail the initial screening. Step 8 addresses risk management issues. The major differences between the Navy ERA policy/guidance and the USEPA ERA guidance are:

- Navy policy/guidance provides clearly defined criteria for exiting the ERA process at specific points
- Navy policy/guidance divides Step 3 (the first step of the BERA) into two distinct sub-steps (Steps 3A and 3B), with a potential exit point after Step 3A
- Navy policy/guidance incorporates risk management considerations throughout all tiers of the ERA process

ERAs are conducted using a tiered, step-wise approach and are punctuated with Scientific Management Decision Points (SMDPs). SMDPs represent points in the ERA process where agreement on conclusions, actions, or methodologies is needed so that the ERA process can continue (or terminate) in a technically defensible manner. The results of the ERA at a particular SMDP are used to determine how the ERA process should proceed, for example, to the next step in the process or directly to a later step. The process continues until a final decision has been reached (remedial action if unacceptable risks are identified, or no further action if risks are acceptable). The process can also be iterative if data needs are identified at any step; the needed data are collected and the process starts again at the point appropriate to the type of data collected.

The screening (preliminary) problem formulation is the first step of an ERA and establishes the goals, scope, and focus of the SERA. Step 1 of the ERA process is intended to answer two main questions:

- Do complete exposure pathways exist?
- Are sufficient data available to conduct the SERA?

If no complete exposure pathways exist, the ERA process terminates at Step 1 with a conclusion of negligible (acceptable) risk because exposure, and thus potential risk, can only occur if complete exposure pathways exist. If one or more complete exposure pathways are known to exist, or are likely to exist, the ERA process continues to Step 2 but only evaluates those pathways that have been determined to be “critical” (ecologically important); that is, represent exposures to sensitive receptors that are associated with the predominant fate and transport mechanisms at the site (USEPA, 1997a). An evaluation of the available data is then conducted to determine if they are adequate to support the SERA. If not, additional data are collected before the ERA process continues. The second step of the ERA process involves conducting a screening exposure assessment, a screening effects assessment, and a screening risk calculation (risk characterization).

The results of the SERA are used to evaluate the potential for unacceptable ecological risks based upon very conservative assumptions. If the results of the SERA suggest that further ecological risk evaluation is warranted, the ERA process proceeds to the BERA (Steps 3 through 7), which is a more detailed phase of the ERA process, for

the pathways, chemicals, receptors, and areas identified in the SERA. As previously indicated, the first step of the BERA (Step 3) is divided into two distinct sub-steps (3A and 3B) in Navy ERA guidance.

Step 3 of the USEPA ERA guidance consists of the following activities (USEPA, 1997a):

1. Refinement of the COPCs from the SERA
2. Further characterizing the potential ecological effects of contaminants
3. Refining information on contaminant fate and transport, complete exposure pathways, and receptors potentially at risk
4. Selecting assessment endpoints
5. Refining the conceptual model and risk hypotheses from the SERA

Step 3A of the Navy policy/guidance (refinement of conservative exposure assumptions) corresponds to the first activity, previously listed, for the USEPA ERA guidance. In Step 3A, a refined evaluation of exposure estimates is conducted using less conservative (but more realistic) assumptions and additional methodologies relative to those used in the SERA, which is intended to be a very conservative assessment (NAVFAC, 2003). Examples of less conservative (but more realistic) exposure assumptions include using central tendency (mean) estimates (rather than maximums) for media concentrations, bioaccumulation factors (BAFs), and exposure parameters. Examples of additional methodologies include the consideration of background concentrations, bioavailability, and detection frequency (CNO, 1999; NAVFAC, 2003).

If risk estimates (and their associated uncertainty) are acceptable following Step 3A (**Section 7.5**), the site will meet the conditions of the exit criterion specified in the Navy policy/guidance. If the Step 3A evaluation does not support a determination of acceptable risk within acceptable uncertainty, the site continues to Step 3B.

Step 3B of the Navy policy/guidance (problem formulation) corresponds conceptually to the last four activities, previously listed, for Step 3 of the USEPA ERA guidance. In Step 3B, the preliminary conceptual model from the SERA is refined based upon the results of the Step 3A evaluation to develop a revised list of key receptors, critical exposure pathways, key COPCs, assessment endpoints, measurement endpoints, and risk hypotheses. Based upon the refined conceptual model, the lines of evidence to be used in characterizing risk are determined. Agreement on the refined conceptual model, COPCs, exposure pathways, endpoints, and risk hypotheses constitutes the SMDP at the end of Step 3 in both Navy and USEPA ERA guidance.

Following the completion of Step 3, a decision point is reached with two potential outcomes. If the refined risk estimates are acceptable for each selected assessment endpoint, the investigation proceeds to risk characterization (Step 7) to document this conclusion, and the ERA process terminates. If the uncertainties associated with the refined risk estimates are unacceptable and/or the risk estimates indicate that unacceptable risks may exist, site-specific studies might be required and the ERA process continues (Steps 4 through 6). Step 4 is a work planning step where additional site-specific studies are scoped and designed. Step 5 consists of the verification of the field sampling design developed in Step 4 while Step 6 constitutes the site investigation and data analysis phase of the process. The scope (the spatial extent of sampling) and components (the collection of biological data such as tissue samples, toxicity testing, and so forth) of any site-specific studies are determined by the conclusions of Step 3 and the pathways/endpoints associated with the potential unacceptable risks.

Step 7 consists of the documentation and synthesis of the information and data identified in Steps 1 through 3 (no additional study) or Steps 1 through 6 (additional study). In this step, risk is evaluated and characterized using both quantitative and qualitative methods. Conclusions are made as to whether or not there is a reasonable potential for unacceptable ecological risk, and if there is a potential for unacceptable ecological risk, the magnitude of that risk. The results of the completed BERA (Step 7) are used to make any necessary risk management decisions (Step 8) related to current or future risks. Possible decisions include:

- Adequate information is available to conclude that no unacceptable ecological risks exist. The assessment should stop at Step 7.

- Adequate information is available to conclude that unacceptable ecological risks exist for which remedial actions or controls are warranted. Whether remedial actions or controls are taken, and the specific actions or controls taken, will depend upon a number of risk management factors such as the results of HHRAs (if applicable) and the potential impact of the remedial action or control itself on the habitats and biota present. This analysis would occur as part of Step 8.
- Adequate information is not available to estimate risk or the risk estimate is believed to be too conservative or uncertain to recommend remediation. The assessment should be refined.

7.2 Problem Formulation

Problem formulation establishes the goals, scope, and focus of the ERA. As part of problem formulation, the ecological setting of Site 24 is characterized in terms of the habitats and biota known or likely to be present. The types and concentrations of chemicals that are present in ecologically relevant media are also described based upon available analytical data. Surface soil (generally 0 to 6 inches bgs) is the primary ecologically relevant medium at the site. Subsurface soils (generally 6 to 24 inches bgs) are also evaluated, per Region 3 BTAG guidance, because some ecological receptors may be exposed to soils at these depths. Groundwater from GW01 through GW10 were also evaluated as a potential transport medium to downgradient water bodies. The groundwater from GW11 was not evaluated in the ERA as the WPNSTA Yorktown Partnering team (including their associated technical support) agreed that the low level of detected constituents detected in this monitoring well did not warrant inclusion of the data in the ERA as they were not likely to pose potential ecological risk.

A conceptual model is developed that describes source areas, transport pathways and exposure media, exposure pathways and routes, and receptors. Assessment endpoints, measurement endpoints, and risk hypotheses are developed to evaluate those receptors for which critical exposure pathways exist. The fate, transport, and toxicological properties of the chemicals present at Site 24, particularly the potential for bioaccumulation, are also considered during this process.

7.2.1 Environmental Setting

Site 24, Aviation Field, consists of an open grassy area around the helicopter landing-pad at WPNSTA Yorktown. Located just south of the York River, the site is approximately 14 acres in size and is bounded by Bellfield Road to the north, former railroad tracks to the east, Main Road to the south, and storage areas to the west (**Figure 1-2**). Historically, the site was used as an aviation field until 1927. After World War I, the site was reportedly used for the storage of munitions, both on the surface and in underground caches, until they were recovered and used during World War II. Site 24 was also used for the storage and burial of miscellaneous materials, including munitions debris, rocket motor casings, batteries, cables, parachutes, and metal and construction debris until the mid-1980s. Aerial photographs indicate that peak aboveground storage activity occurred in 1968. Areas of surface debris are no longer evident at the site. **Figure 1-4** show the likely locations of this storage and disposal; the exact location of some of these areas (e.g., the TNT storage area) are not well documented. The area where the helicopter landing-pad is currently located may also have been used briefly as an explosives burning area. A bioremediation cell (**Figure 1-2**), constructed on the northern side of the site in 1999 to treat contaminated soil and sediment from nearby Site 6, was removed from Site 24 in December 2006 once treatment of these media was completed, as documented in the Construction Completion Report for Site 6 (Shaw, 2008).

Currently, Site 24 and the surrounding area is used by JIEDDO as a training facility (**Figure 1-3**). The facility consists of practice roadways and buildings intended for the training of military personnel in the identification and disarmament of improvised explosive devices. This facility will be completed in late 2011 and this site use is expected to remain the same for the foreseeable future.

Extensive wooded tracts are present to the east, west, and south of the site. Outside of the existing training facility area, Site 24 is mostly covered with herbaceous plant species (such as dandelion, clover, and plantain) and is periodically mowed. Some woody shrubs and small trees exist in the area north of the helicopter landing-pad. No wetlands or water bodies; rare, threatened, or endangered species; or sensitive environments have been identified at Site 24 (CH2M HILL/Baker, 2008).

The site sits on a topographic high, which causes groundwater and surface water to flow radially from the vicinity of monitoring well MW10 out toward the north, east, and west (**Figure 3-6**). However, due to the small elevation change across the site, surface runoff is minimal even after a storm event, and these ditches rarely hold water and only for brief periods of time. Groundwater flow is more complex. Flow is to the north, toward the York River (located about 400 feet north of the site), east, toward Indian Field Creek (located about 2,000 feet east of the site), and west, toward Felgates Creek (located about 1,200 feet west of the site). All of these water bodies are tidal and brackish to saline. No surface runoff from the site is expected to reach any of these water bodies.

7.2.2 Data Used in the ERA

Both historical soil samples (from 1994 and 1997) and soil samples collected as part of this RI (in 2010) were quantitatively evaluated in this ERA. Since ecological exposures are generally confined to the top 2 feet of the soil column, the soil data used in this ERA were generally confined to this depth range but were evaluated separately as surface samples (typically 0 to 6 inches) and subsurface samples (typically 6 to 24 inches). In two cases, soil data from 0 to 24 inches were included as surface soil samples because no 0 to 6 inch soil data were available from the same location. Similarly, a number of subsurface soil samples collected from 12 to 36 inches were used when data from 6 to 24 inches were not available. Soil data from deeper depths (below 24 to 36 inches) were available but were not considered in this ERA per Region 3 BTAG guidance.

Although ecological receptors do not typically have direct exposure to groundwater, groundwater data collected as part of this RI were also evaluated in this ERA. This was done to provide a conservative evaluation of the potential for significant contaminant transport via groundwater to downgradient receiving water bodies and the subsequent potential exposure of ecological receptors in these water bodies.

The samples used in this ERA are listed in **Table 7-1** and are shown on **Figures 4-3, 4-11,** and **4-13**. The analytical results for these samples can be found in **Appendix K.**

7.2.3 Conceptual Model

The conceptual model relates potentially exposed receptor populations with potential source areas based upon physical site characteristics and complete exposure pathways. Important components of the conceptual model are the identification of potential source areas, transport pathways, exposure media, exposure pathways and routes, and receptors. Actual or potential exposures of ecological receptors associated with a site are determined by identifying the most likely, and most important, mechanisms and pathways of contaminant release and transport. A complete exposure pathway has three components: (1) a source or sources of contamination that results in a release to the environment; (2) a pathway and mechanism of chemical transport through an environmental medium; and (3) an exposure or contact point for an ecological receptor. **Figure 7-1** illustrates a diagrammatic conceptual model for Site 24. Key components of this conceptual model are discussed in the following subsections.

7.2.3.1 Source Areas

The sources of potential contamination at Site 24 are the historical storage and debris areas, as shown on **Figure 1-4.** These potential source areas are discussed in more detail in **Section 1**.

7.2.3.2 Transport Pathways and Exposure Media

A transport pathway describes the mechanisms whereby site-related chemicals, once released, may be transported from a source to ecologically relevant media (such as surface soil) where exposures may occur. These transport pathways are shown on **Figure 7-1**.

The primary release mechanisms and transport pathways at the site include:

- Possible surface runoff from source areas to other areas of the site, such as the drainage ditches
- Infiltration, percolation, and leaching of contaminants to groundwater and subsequent discharge to the surface water and sediment of downgradient water bodies (York River, Indian Field Creek, and Felgates Creek)
- Uptake from the surface soil and accumulation in the tissues of terrestrial biota

Exposure media for ecological receptors are typically limited to surface water, surface sediment, and surface soil. Surface water and sediment are not evaluated in this ERA because the site does not contain wetlands or water bodies. Subsurface soils (typically 6 to 24 inches bgs) are also evaluated because some ecological receptors may be exposed to soils at these depths. Groundwater is generally considered only as a transport medium since there are no ecological exposures to groundwater until it discharges to a water body or surfaces as a seep. In this ERA, groundwater is evaluated as a potential transport medium to downgradient water bodies (York River, Indian Field Creek, and Felgates Creek). Air is not addressed in this ERA since this medium is not likely to result in significant contributions to total exposures.

7.2.3.3 Exposure Pathways and Routes

An exposure pathway links a source of contamination with one or more receptors through exposure via one or more media and exposure routes. Exposure, and thus potential risk, can only occur if complete exposure pathways exist. **Figure 7-1** shows the potentially complete exposure pathways to ecological receptors associated with Site 24, which include:

- Direct contact with site-related chemicals in surface soil for lower trophic level receptors (such as plants and soil invertebrates)
- Potential ingestion of site-related chemicals via the food chain by avian, mammalian, and reptilian terrestrial receptors

As discussed previously, there are no complete exposure pathways for aquatic receptors on the site due to the lack of wetland and aquatic habitats. However, groundwater is evaluated as a potential transport medium to downgradient water bodies (York River, Indian Field Creek, and Felgates Creek).

An exposure route describes the specific mechanism(s) by which a receptor is exposed to a chemical present in an environmental medium. The most common exposure routes are dermal contact, direct uptake, ingestion, and inhalation. Terrestrial plants may be exposed to chemicals present in surface soils through their root surfaces during water and nutrient uptake. Terrestrial invertebrates may be exposed to chemicals in surface soil through dermal contact and ingestion.

Animals may be exposed to chemicals through the following routes:

- Inhalation of gaseous chemicals or of chemicals adhered to airborne particulate matter
- Incidental ingestion of contaminated abiotic media (soil) during feeding or preening activities
- Ingestion of contaminated water
- Ingestion of contaminated plant and/or animal tissues for chemicals that have entered food webs
- Dermal contact with contaminated abiotic media

These routes, where applicable, are depicted on **Figure 7-1**.

Incidental ingestion of soil and exposure via food webs are the primary exposure routes for upper trophic level receptors (such as birds and mammals). The contribution to the total dose from the inhalation route is generally insignificant for upper trophic level ecological receptors relative to ingestion pathways. Hence, the air pathway is not generally considered for ecological receptors. Exposure to chemicals present in surface soil via dermal contact may occur but is unlikely to represent a major exposure pathway for most upper trophic level receptors because fur or feathers minimize transfer of chemicals across dermal tissue. Incidental ingestion of surface soil during feeding, preening, or grooming activities is, however, considered in the risk estimates. Direct contact is considered for lower trophic level receptors (soil invertebrates).

Direct ingestion of drinking water is only considered when a permanent or semi-permanent source of water with a salinity below 15 parts per thousand (ppt), the approximate toxic threshold for wildlife receptors (Humphreys, 1988), exists on a site. There are no permanent or semi-permanent sources of water on the site. The drainage ditches on Site 24 contain water only in the event of a rainstorm and only for relatively brief periods of time. Thus, exposure via direct ingestion of drinking water is not included in this ERA.

7.2.3.4 Receptors

Because of the complexity of natural systems, it is generally not practical to directly assess the potential impacts to all ecological receptors present at a site. Therefore, specific receptor species (such as red-tailed hawk) or species groups (such as plants) are selected as surrogates to evaluate potential risks to larger components of the ecological community (guilds; such as carnivorous birds) used to represent the assessment endpoints (such as survival and reproduction of carnivorous birds). Selection criteria typically include those species that:

- Are known to occur, or are likely to occur, at the site
- Have a particular ecological, economic, or aesthetic value
- Are representative of taxonomic groups, life history traits, and/or trophic levels in the habitats present for which complete exposure pathways are likely to exist
- Can, because of toxicological sensitivity or potential exposure magnitude, be expected to represent potentially sensitive populations

The following upper trophic level receptor species have been chosen for exposure modeling in terrestrial habitats based upon the previously listed criteria:

- Mourning dove (*Zenaida macroura*) - terrestrial avian herbivore
- American robin (*Turdus migratorius*) - terrestrial avian omnivore/invertivore
- Red-tailed hawk (*Buteo jamaicensis*) - terrestrial avian carnivore
- Meadow vole (*Microtus pennsylvanicus*) - terrestrial mammalian herbivore
- Short-tailed shrew (*Blarina brevicauda*) - terrestrial mammalian invertivore
- Red fox (*Vulpes vulpes*) - terrestrial mammalian carnivore

Upper trophic level receptor species quantitatively evaluated in this ERA were limited to birds and mammals, the taxonomic groups with the most available information regarding exposure and toxicological effects. Lower trophic level receptor species were evaluated based upon those taxonomic groupings for which soil screening values have been developed. As such, specific species of plants or soil invertebrates in terrestrial habitats were not chosen as receptors because of the limited information available for specific species and because these receptors were evaluated on a community level via a comparison of chemical concentrations in soil-to-soil screening values.

Amphibians are typically selected as a receptor group only when freshwater aquatic or wetland habitats are present on, or in the contaminant transport pathways (as defined in the conceptual model) of, a site. This is not the case at Site 24 based upon the general lack of these habitats. However, some portions of the downgradient drainage areas may be utilized to some extent by more terrestrially-orientated amphibians in areas close to fresh water bodies (e.g., the upper reaches of Felgates and Indian Field Creeks). However, a formal assessment endpoint was not added for this receptor group because most nearby water bodies that contain water on a permanent or semi-permanent basis are brackish to saline.

Reptiles are an applicable receptor group. Individual species of reptiles are not, however, selected for evaluation because of the general lack of available toxicological information for this taxonomic group for direct effects and effects from exposures via food webs. Potential risks to reptiles from food web exposures are evaluated using other fauna (birds and mammals) as surrogates. Similarly, potential risks to this group from direct exposures to surface soil are evaluated using soil screening values developed for other taxonomic groups (previously described). This is discussed further in **Section 7.6.**

7.2.3.5 Endpoints and Risk Hypotheses

The conclusion of the problem formulation includes the selection of ecological endpoints and risk hypotheses, which are based upon the conceptual model. Two types of endpoints, assessment endpoints and measurement endpoints, are defined as part of the ERA process (USEPA, 1997a). An assessment endpoint is an explicit expression of the environmental component or value that is to be protected. A measurement endpoint is a measurable ecological characteristic that is related to the component or value chosen as the assessment endpoint. The considerations for selecting assessment and measurement endpoints are summarized in USEPA

(1997a) and discussed in detail in Suter (1989; 1990; 1993). Risk hypotheses are testable hypotheses about the relationship among the assessment endpoints and their predicted responses when exposed to contaminants.

Endpoints define ecological attributes that are to be protected (assessment endpoints) and measurable characteristics of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur. Assessment endpoints most often relate to attributes of biological populations or communities, and are intended to focus the risk assessment on particular components of the ecosystem that could be adversely affected by chemicals attributable to a site (USEPA, 1997a). Assessment endpoints contain an entity (such as hawk population) and an attribute of that entity (such as survival rate). Individual assessment endpoints usually encompass a group of species or populations (the receptor) with some common characteristic, such as specific exposure route or contaminant sensitivity, with the receptor then used to represent the assessment endpoint in the risk evaluation.

Assessment and measurement endpoints may involve ecological components from any level of biological organization, from individual organisms to the ecosystem itself. Effects on individual organisms are important for some receptors, such as rare and endangered species; population- and community-level effects are typically more relevant to ecosystems. Population- and community-level effects are usually difficult to evaluate directly without long-term and extensive study. However, measurement endpoint evaluations at the individual level, such as an evaluation of the effects of chemical exposure on reproduction, can be used to predict effects on an assessment endpoint at the population or community level. In addition, use of criteria values designed to protect the majority of the components of a community (such as the Ambient Water Quality Criteria [AWQC] for the Protection of Aquatic Life) can be useful in evaluating potential community- and/or population-level effects.

Table 7-2 shows the assessment endpoints, risk hypotheses, and measurement endpoints used in the ERA. **Table 7-2** also shows the receptors associated with each endpoint.

7.3 Exposure Assessment

The principal activity associated with the exposure assessment is the estimation of chemical concentrations in applicable media, termed EPCs, to which the receptors may be exposed. This is accomplished through the selection of appropriate sets of the available analytical data using a set of criteria (such as validation status, sampling date). Once the analytical data sets are selected, EPCs are calculated as a particular point on the distribution of concentrations. At the screening level (SERA; Step 2), the EPC is the maximum detected concentration. At the baseline level (BERA; Step 3A), EPCs are central tendency estimates (arithmetic mean). EPCs are then used in bioaccumulation and food web models to estimate exposures to upper trophic level receptors.

For conservatism, the maximum (SERA) and mean (BERA) reporting limits for chemicals analyzed for but not detected were also compared to medium-specific ESVs and (where applicable) used for food web exposure modeling. This was done to determine if reporting limits were less than chemical concentrations at which potential adverse effects to ecological receptors may occur.

7.3.1 Selection Criteria for Analytical Data

Available analytical data (**Section 7.2.2**) were selected for use in the ERA based upon the following:

- Data must have been validated by a qualified data validator using acceptable data validation methods. Rejected (R) values were not used in the ERA. Unqualified data and data qualified as J (estimated), L (biased low), or K (biased high) were treated as detected. Data qualified as U (undetected) or B (blank contamination) were treated as non-detected.
- For samples with duplicate analyses, the higher of the two concentrations was used, for conservatism, when both values were detects or when both values were non-detects. In cases where one result was a detection and the other a non-detect, the detected value was used in the assessment.
- For non-detected results, the sample quantitation (reporting) limit (SQL) was used to represent the concentration. When calculating statistics (such as arithmetic mean), one-half of the SQL was used for non-detected results.

7.3.2 Data Groupings

Surface and subsurface soil data were partitioned into the following groups:

- **Drainages –** All samples collected from drainage ditches (surface soil only [**Table 7-1**]).
- **Inside Waste Boundary –** All samples collected from inside the estimated waste boundary (**Table 7-1**). No subsurface soil samples within the proper depth range were available for this group.
- **Outside Waste Boundary –** All samples collected from outside the estimated waste boundary (**Table 7-1**).
- **Sludge Area –** All samples collected from the sludge area (**Table 7-1**).

Groundwater data were partitioned into the following groups:

- **York River Watershed –** samples from monitoring wells whose flow is towards the York River (**Table 7-1**).
- **Indian Field Creek Watershed –** samples from monitoring wells whose flow is towards Indian Field Creek (**Table 7-1**).
- **Felgates Creek Watershed –** samples from monitoring wells whose flow is towards Felgates Creek (**Table 7-1**).

Facility-wide background surface soil, subsurface soil, and groundwater data were also used in the BERA to help evaluate the site-relatedness of the chemicals detected in site samples.

7.3.3 Exposure Point Concentrations

EPCs are calculated as a particular point on the distribution of concentrations. At the screening level, the EPC is the maximum detected concentration. At the baseline level, EPCs are typically central tendency estimates (arithmetic mean), which provide a more representative estimate of potential exposures and risks to receptor populations (the focus of the selected assessment endpoints). In this ERA, the maximum, arithmetic mean, and 95 percent UCL of the arithmetic mean concentrations were evaluated for direct exposures. Exposures via food webs also utilized the maximum, arithmetic mean, and 95 percent UCL of the arithmetic mean. These three medium-specific EPCs were also used in bioaccumulation and food web models to estimate exposures to upper trophic level receptors. Dietary items for which tissue concentrations were modeled included terrestrial plants, soil invertebrates, and small mammals. Incidental ingestion of soil, but not ingestion of drinking water (due to the lack of a permanent drinking water source at the site), was included when calculating the total exposure. The models and parameter values used for calculating these tissue concentrations are outlined in the following subsections.

Not all chemicals were evaluated for food web exposures. Only those chemicals with the potential to bioaccumulate to a significant extent, as defined in Table 4-2 of USEPA (2000), were evaluated. This list of bioaccumulating chemicals is provided in **Table 7-3** for chemicals relevant to Site 24.

For the screening (SERA) exposure estimates, the uptake of chemicals from the abiotic medium (surface soil) into food items was based upon conservative (90th percentile) BCFs or BAFs from the literature, where available. The 90th percentile is generally recommended to provide for a conservative screening assessment (Sample et al., 1998a; 1998b; Bechtel Jacobs, 1998b). If 90th percentile values were not available in the cited reference, the maximum value was used, if available. If only central tendency (median) values were reported, they were used for both the SERA and BERA. Where an individual study (as opposed to a compilation of multiple studies) was cited, the best available value was sometimes a single value or the derivation was not specified. Default (assumed) factors of 1.0 were used only when data were not readily available for a chemical in the literature. In some cases, chemical concentrations in food items were directly estimated from maximum surface soil concentrations using available literature-based regression models.

BCFs and BAFs used for baseline (BERA) exposure estimates were based upon, or modeled from, central tendency estimates (such as median or mean). Baseline values considered both the distribution of the data (normal or log normal) and the recommendations in the cited reference. Geometric means were preferred for log normal distributions and arithmetic means for normal distributions. In some cases, neither distribution was applicable or

the distribution was biased by an outlying value. In these cases, point estimates like the median were then considered. Where an individual study (as opposed to a compilation of multiple studies) was cited, the best available value was sometimes a single value or the derivation was not specified. Default (assumed) factors of 1.0 were used only when data were not readily available for a chemical in the literature. In some cases, chemical concentrations in food items were directly estimated from mean surface soil concentrations using available literature-based regression models.

In the BERA, using central tendency estimates (rather than high-end values or maximums) for exposure parameters such as BAFs provides a more representative estimate of potential exposures and risks to receptor populations (which are the focus of the selected assessment endpoints) of upper trophic level receptors. Since these upper trophic level receptors are highly mobile, they would be expected to effectively average their exposure over time as they forage within the area defining their home range. Average prey concentrations are most appropriately estimated using central tendency estimates of media concentrations and accumulation factors. For example, the wildlife dietary exposure models contained in the *Wildlife Exposure Factors Handbook* (USEPA, 1993a) specify the calculation of an average daily dose. Increasing the representativeness of the exposure estimates relative to population-level effects is consistent with the intent of a BERA. In cases where adequate spatial sampling coverage exists, mean concentrations are also appropriate for evaluating potential risks to populations of lower trophic level receptors because the members of the population are expected to be found throughout an area (where suitable habitat is present), rather than concentrated in one particular location. While effects to individual organisms might be important for some receptors, such as rare and endangered species, population- and community-level effects are typically more relevant to ecosystems. For this ERA, the receptor populations of interest are those that utilize all or part of the site, but such use in not necessarily exclusive to the site for the entire population.

7.3.3.1 Terrestrial Plants

For most chemicals, tissue concentrations in the aboveground vegetative portion of terrestrial plants were estimated by multiplying the maximum (SERA) or mean (BERA) surface soil concentration for each bioaccumulative chemical by chemical-specific soil-to-plant BAFs obtained from the literature. These BAFs, for both the SERA and BERA, are listed in **Table 7-4**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table 7-5**.

The BAF values used were based upon root uptake from soil and upon the ratio between dry-weight soil and dry-weight plant tissue. Literature values based upon the ratio between dry-weight soil and wet-weight plant tissue were converted to a dry-weight basis by dividing the wet-weight BAF by an estimated solids content for terrestrial plants (15 percent [0.15] [Sample et al., 1997]).

For inorganic chemicals lacking literature-based, chemical-specific BAFs or applicable algorithms, a soil-to-plant BAF of 1.0 was used. For non-ionic organic chemicals (with a log K_{ow} of between 3 and 8) without literature-based BAFs, soil-to-plant BAFs were estimated using the rinsed foliage algorithm provided on Figure 5B of USEPA (2007):

$$\log BAF = (-0.4057)(\log K_{ow}) + 1.781$$

where: BAF = Soil-to-plant BAF (unitless; dry-weight basis)
K_{ow} = Octanol-water partitioning coefficient (unitless)

The log K_{ow} values used in this equation are listed in **Table 7-3**.

7.3.3.2 Soil Invertebrates (Earthworms)

For most chemicals, tissue concentrations in soil invertebrates (earthworms) were estimated by multiplying the maximum (SERA) or mean (BERA) surface soil concentration for each bioaccumulative chemical by chemical-specific soil-to-invertebrate BCFs or BAFs obtained from the literature. These BAFs, for both the SERA and BERA, are listed in **Table 7-6**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table 7-5**.

BCFs are calculated by dividing the concentration of a chemical in earthworm tissue by the concentration of that same chemical in the surrounding environmental medium (in this case, soil) without accounting for uptake via the diet. BAFs consider both direct exposure to soil and exposure via the diet. Because earthworms consume soil, BAFs are more appropriate values and were used when available. BAFs based upon depurated analyses (soil was purged from the gut of the earthworm prior to analysis) were given preference over undepurated analyses when selecting BAF values because direct ingestion of soil is accounted for separately in the food web model.

The BCF/BAF values selected were based upon the ratio between dry-weight soil and dry-weight earthworm tissue. Literature values based upon the ratio between dry-weight soil and wet-weight earthworm tissue were converted to a dry-weight basis by dividing the wet-weight BCF/BAF by the estimated solids content for earthworms (16 percent [0.16] [USEPA, 1993a]). For chemicals without available measured BAFs/BCFs, an earthworm BAF was estimated using available regression equations from the literature, was estimated using data for similar chemicals, or a BAF of 1.0 was assumed.

7.3.3.3 Small Mammals

Whole-body tissue concentrations in small mammals were estimated using one of two methodologies. For chemicals with literature-based soil-to-small mammal BAFs, the small mammal tissue concentration was calculated by multiplying the maximum (SERA) or mean (BERA) surface soil concentration for each bioaccumulative chemical by a chemical-specific soil-to-small mammal BAF obtained from the literature. These BAFs, for both the SERA and BERA, are listed in **Table 7-7**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table 7-5**.

The BAF values selected were based upon the ratio between dry-weight soil and whole-body dry-weight tissue. Literature values based upon the ratio between dry-weight soil and wet-weight tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for small mammals (32 percent [0.32] [USEPA, 1993a]).

For chemicals without soil-to-small mammal BAF values or algorithms, an alternate approach was used to estimate whole-body tissue concentrations. Because most chemical exposure for these small mammals is via the diet, it was assumed that the concentration of each bioaccumulative chemical in the small mammal's tissues was equal to the chemical concentration in its diet multiplied by a diet to whole-body BAF derived from the literature. The small mammal tissue concentration was calculated as follows:

$$TC_x = [[\sum_i (FC_{xi})(PDF_i)] + [(SC_x)(PDS)]] \, (BAF_{diet\text{-}whole\ body})$$

where:

TC_x	=	Small mammal tissue concentration for chemical x (mg/kg, dry weight)
FC_{xi}	=	Concentration of chemical x in food item i (mg/kg, dry weight)
PDF_i	=	Proportion of diet composed of food item i (dry weight basis)
SC_x	=	Concentration of chemical x in soil (mg/kg, dry weight)
PDS	=	Proportion of diet composed of soil (dry weight basis)
BAF	=	Diet to whole-body BAF (unitless, dry weight basis)

This equation is basically a weighted average of the chemical concentration in the various dietary components (including soil ingestion) for the small mammal, multiplied by a diet-to-whole body BAF, and thus excludes water ingestion.

For chemicals lacking diet to whole-body BAF values (not to be confused with the soil-to-small mammal BAFs listed in **Table 7-7**), a diet to whole-body BAF of 1 was assumed. The use of a diet to whole-body BAF of 1 is likely to result in a conservative estimate of chemical concentrations for chemicals that are not known to biomagnify in terrestrial food webs and a reasonable estimate of chemical concentrations for chemicals that are known to bioaccumulate or biomagnify, based upon reported literature values. For example, a maximum diet to whole-body BAF value of 1.0 was reported by Simmons and McKee (1992) for PCBs based upon laboratory studies with white-footed mice. Menzie et al. (1992) reported diet to whole-body BAF values for

dichlorodiphenyltrichloroethane (DDT) of 0.3 for voles and 0.2 for short-tailed shrews. Reported diet to whole-body BAF values for dioxin were only slightly above 1 (1.4) for the deer mouse (USEPA, 1990).

7.3.3.4 Dietary Intakes

Upper trophic level receptor exposures via the food web to chemicals present in surface soil were determined by estimating the chemical concentrations in each relevant dietary component for each receptor, as described in the previous subsection. Incidental ingestion of surface soil was included when calculating the total exposure. Direct ingestion of drinking water was not included.

Dietary intakes for each upper trophic level receptor were calculated using the following formula (modified from USEPA [1993a]):

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

where:

DI_x	=	Dietary intake for chemical x (mg chemical/kg body weight/day)
FIR	=	Food ingestion rate (kg/day, dry weight)
FC_{xi}	=	Concentration of chemical x in food item i (mg/kg, dry weight)
PDF_i	=	Proportion of diet composed of food item i (dry weight basis)
SC_x	=	Concentration of chemical x in soil (mg/kg, dry weight)
PDS	=	Proportion of diet composed of soil (dry weight basis)
WIR	=	Water ingestion rate (liters per day [L/day])
WC_x	=	Concentration of chemical x in water (mg/L)
BW	=	Body weight (kg)

Incidental ingestion of soil was modeled as a dietary component rather than using a separate soil ingestion rate. Water ingestion was set to 0. Parameter values for the selected receptors (**Section 7.2.3.4**) are listed in **Tables 7-8** (screening) **and 7-9** (baseline). When measured food ingestion rates were not available for a receptor from the literature, the rates were estimated using allometric equations from Nagy (2001). For receptors that consume small mammals (red fox and red-tailed hawk), it was assumed that the small mammal portion of the diet was composed of equal parts voles (herbivores) and shrews (insectivores).

The exposure parameter values were selected to provide for a conservative evaluation at the screening level (Step 2). Examples of these conservative assumptions include:

- All of the dietary items consumed by the receptor are obtained from the site (an Area Use Factor [AUF] of 1 was assumed) at the point of maximum concentration.
- Chemicals are 100 percent bioavailable.
- Maximum food ingestion rates were used (calculated maximum ingestion rates using allometric equations were based upon the maximum adult body weight).
- Minimum adult body weights were used.

For the baseline (Step 3A) estimates:

- Central tendency estimates (such as mean, median, or midpoint) for adult body weight and ingestion rates were used. Central tendency estimates for these exposure parameters are more relevant for a BERA because they better represent the characteristics of a greater proportion of the individuals in the population. Populations or communities (rather than individual organisms) were emphasized when developing the assessment endpoints for the ERA.

An AUF of 1.0 was retained in Step 3A.

7.4 Effects Assessment

The effects assessment defines the methods and data used to define an adverse ecological effect. For this ERA, effects data are available from multiple lines of evidence, as follows:

- **ESVs for Surface Soil** - Analytical surface soil data are compared to the surface soil ESVs developed in **Section 7.4.1.**
- **ESVs for Surface Water** - Analytical groundwater data are compared to literature-based surface water ESVs developed in **Section 7.4.1.**
- **Toxicity Reference Values (TRVs) for Ingestion Exposures** - Food web exposure estimates are compared to ingestion-based TRVs developed in **Section 7.4.2** for upper trophic level receptors.
- **Bioavailability Measures** - Additional data were collected to help evaluate chemical-specific bioavailability in abiotic media.

In addition, comparison of site surface soil and groundwater concentrations to facility background concentrations was conducted as an additional line of evidence (**Section 7.5**).

7.4.1 Medium-Specific ESVs

Medium-specific ESVs were established for each ecologically relevant medium. Based upon the conceptual model (**Figure 7-1**), exposure to surface (and shallow subsurface) soils, and possible indirect exposure to groundwater, are the potentially complete pathways.

7.4.1.1 Soil ESVs

The soil ESVs used in the ERA are summarized in **Table 7-10**. When more than one ESV was available (such as fauna and flora) from a particular source for a chemical, the lowest of these values was selected.

7.4.1.2 Surface Water ESVs

The surface water ESVs used to screen groundwater considered the salinity of the receiving water body to determine whether to apply freshwater or marine values. Because the salinity of the York River, Felgates Creek, and Indian Field Creek all typically exceed 10 ppt, marine ESVs were used when available; freshwater values (if available) were used if marine values were lacking. The values used in the ERA are summarized in **Table 7-11**.

The surface water ESVs used in the ERA considered Region 3 BTAG screening values (USEPA, 2006) as well as additional ESVs available from the literature. When more than one ESV was available (such as fauna and flora) from a particular source for a chemical, the lowest of these values was selected. The ESVs for chemicals known to bioaccumulate in aquatic food webs were based upon the final chronic value (rather than the final residue value) as per USEPA (1996a; 2009b) and Suter and Tsao (1996). The use of final chronic values is intended to protect aquatic receptors from direct exposures to chemicals in surface water, rather than from exposure via food webs.

7.4.2 Ingestion TRVs

Ingestion TRVs for dietary exposures were derived for each bioaccumulative chemical evaluated in the ERA. TRVs were derived for both mammalian and avian receptors, the only two taxonomic groups for which sufficient toxicological information was generally available for the range of bioaccumulative chemicals evaluated. Toxicological information from the literature for wildlife species most closely related to the receptor species were used, where available, but were supplemented by laboratory studies of non-wildlife species (such as laboratory mice) where necessary. The ingestion TRVs are expressed as milligrams of the chemical per kilogram body weight of the receptor per day (mg/kg-BW/day).

Survival, growth, and reproduction were emphasized as toxicological endpoints because they are the most relevant, ecologically, to maintaining viable populations and because they are generally the most studied toxicological endpoints for ecological receptors. Endpoints based upon reproduction were generally preferred to those based upon growth which were preferred to those based upon survival. If several chronic toxicological

studies were available from the literature, the most appropriate study was selected for each receptor species based upon study design, study methodology, study duration, study endpoint, and test species.

Ingestion TRVs were derived for both chronic NOAEL and chronic LOAEL endpoints. The applicable UFs from **Table 7-12** were used to derive these TRVs where appropriate (UFs were not generally applied to TRVs obtained from ecological soil screening level (Eco-SSL) documents because these TRVs often encompassed multiple studies). Because assessment endpoints were based upon population- or community-level effects, no intraspecies UFs were applied. Because there are no threatened or endangered species known to occur in the Site 24 area, the application of additional UFs for this class of receptors is not applicable to the ERA. Taxonomic class-type UFs were also not applied because the TRVs selected were typically derived based upon data from a broad range of taxonomic groups. Maximum Acceptable Toxicant Concentrations (MATCs), defined as the geometric mean of the NOAEL and LOAEL, were also calculated. Ingestion TRVs for mammals and birds are listed in **Tables 7-13 and 7-14**, respectively.

7.4.3 Bioavailability Measures

Data collected to evaluate the potential chemical-specific bioavailability in abiotic media included:

- **Soil** –TOC, pH, and grain size
- **Groundwater** - Dissolved metals

7.5 Risk Characterization

The risk characterization portion of the ERA uses the information generated during the three previous parts of the ERA (problem formulation, exposure assessment, and effects assessment) to estimate potential risks to ecological receptors at the level of conservatism applied (screening or baseline).

7.5.1 SERA Approach

The main objective of risk characterization at the screening level (termed risk calculation) is to derive a list of COPCs. As part of this risk calculation, the maximum exposure concentrations (abiotic media) or maximum exposure doses (upper trophic level receptors) are compared with the corresponding ESVs or TRVs to derive risk estimates using the HQ method. HQs are calculated by dividing the chemical concentration in the medium being evaluated by the corresponding medium-specific ESV or by dividing the exposure dose by the corresponding ingestion-based TRV. HQs equaling or exceeding 1 indicate the potential for unacceptable risk since the chemical concentration or dose (exposure) equals or exceeds the ESV or TRV (effect); these chemicals are identified as COPCs at Step 2. However, ESVs/TRVs and exposure estimates are derived using intentionally conservative assumptions at the screening level such that HQs greater than or equal to 1 do not necessarily indicate that unacceptable risks are present. Rather, it identifies chemical-pathway-receptor combinations requiring further evaluation using less conservative (but more realistic) exposure scenarios and assumptions. HQs less than 1 indicate that unacceptable risks are unlikely, enabling a conclusion of negligible (acceptable) risk to be reached with high confidence.

In addition to chemicals that exceed medium-specific ESVs based upon maximum detected concentrations, or that exceed TRVs based upon maximum ingestion doses, the following also applies to COPC selection at Step 2:

- Non-detected chemicals were retained as COPCs if the maximum detection limit exceeded the ESV for that medium or if the ingestion dose calculated using the maximum detection limit exceeded the TRV.
- All detected chemicals lacking a TRV and/or ESV were retained as COPCs.
- The essential nutrients calcium, magnesium, potassium, and sodium were excluded as potential COPCs since they are essential macronutrients that are needed in relatively high concentrations for normal metabolism, growth, and reproduction.

7.5.2 BERA Approach

COPCs from the SERA are reevaluated in the first step of the BERA (Step 3A). As discussed previously, this reevaluation involves using less conservative (but more realistic) assumptions about exposures and a comparison

of these revised exposure estimates (based upon central tendency estimates of media concentrations, BAFs, and/or exposure parameters) with ESVs and TRVs.

In addition to chemicals that exceed medium-specific ESVs based upon mean detected concentrations, or that exceed TRVs based upon mean ingestion doses, the following also applies to COPC selection at Step 3A:

- All detected chemicals lacking a TRV and/or ESV were retained as COPCs for risk evaluation.
- Ingestion-based (food web) COPCs were based upon a comparison of mean and 95 percent UCL exposure doses with ingestion TRVs based upon the NOAEL, MATC, and LOAEL. An exceedance of the MATC was generally considered an unacceptable risk at Step 3A, although chemicals that exceeded the MATC, but not the LOAEL, are discussed for possible risk management considerations. Exceedances of the LOAEL are almost always considered unacceptable and thus do not normally need to be discussed by the risk managers. Dose estimates that are less than the MATC are generally considered acceptable and also normally do not need to be discussed by the risk managers except in limited cases (e.g., listed species are present). Thus, it is generally only those results between the MATC and LOAEL that risk managers need to decide are unacceptable or not.

For Step 3A, the following additional factors were also considered, as appropriate:

- **Frequency of Detection.** Frequency of detection was used as line of evidence in Step 3A but was not used as the sole basis to eliminate a chemical. Chemicals that were detected in less than five percent of the samples in a medium were generally eliminated as COPCs in that medium if at least 20 samples were available (USEPA, 1989). It is unlikely that infrequently detected chemicals represent an unacceptable risk to receptors at the population level, due to limited spatial exposure. However, the magnitude of any screening value exceedances was also considered concurrently with frequency of detection to ensure that “hot spot” areas were not eliminated from consideration based upon this screening criterion.
- **Background Concentrations.** Facility-specific background concentrations were also considered in the reevaluation for soil and groundwater. The background evaluation consisted of a direct comparison of site concentrations to the UTLs developed for inorganic constituents in the background study in a manner analogous to the comparison to ESVs. Soil background 95 percent UTL values have been developed separately for surface and subsurface soils. The background 95 percent UTL values for groundwater have been derived for both the Yorktown-Eastover aquifer (deep) and the Cornwallis Cave aquifer (shallow).

7.5.3 Comparison With Ecological Screening Values

As discussed in **Section 7.3.3**, the maximum, arithmetic mean, and 95 percent UCL of the arithmetic mean concentrations were compared with ESVs. Chemicals were excluded from further consideration in the SERA if the HQ based upon the maximum concentration was less than 1. Chemicals were excluded from further consideration in the BERA if the HQ based upon the 95 percent UCL was less than 1. Initially, the medium-specific comparisons (for surface soil, subsurface soil, and groundwater) were conducted for the site as a whole. Area-specific comparisons, using the data groupings discussed in **Section 7.3.2**, were then conducted, but only for the chemicals whose maximum concentrations exceeded ESVs in the initial screen or that were detected but lacked an ESV.

7.5.3.1 Surface Soil

Site-wide surface soil concentrations were first compared to soil ESVs for plants and soil invertebrates. Chemicals that exceeded ESVs based upon maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section 7.3.2**.

Site-Wide Evaluation. Site-wide maximum, mean, and 95 percent UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table 7-15**. **Table 7-15** also contains a comparison against background UTLs for metals that exceeded soil ESVs based upon 95 percent UCL concentrations.

Seven metals (aluminum, arsenic, copper, iron, manganese, mercury, and selenium) and two pesticides (alpha-chlordane and gamma-chlordane) exceeded ESVs based upon maximum detected concentrations (**Table 7-15**). The ESVs for aluminum and iron were based upon soil pH; soil pH data are reported in **Table 7-16**. Benzaldehyde,

dibenzofuran, 2-butanone, acetone, carbon disulfide, and methyl acetate were detected in at least one surface soil sample but ESVs were not available. Thus, aluminum, arsenic, copper, iron, manganese, mercury, selenium, alpha-chlordane, gamma-chlordane, benzaldehyde, dibenzofuran, 2-butanone, acetone, carbon disulfide, and methyl acetate were identified as Step 2 COPCs. One metal (thallium), one pesticide (toxaphene), and two SVOCs (4-nitrophenol and atrazine) were not detected but maximum detection limits exceeded ESVs. These four chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL concentrations in surface soil are also compared with ESVs in **Table 7-15**. Only mercury had an HQ that exceeded 1 based upon the 95 percent UCL concentration; mercury also exceeded the background UTL. Benzaldehyde, dibenzofuran, 2-butanone, acetone, carbon disulfide, and methyl acetate were detected but soil ESVs were not available. Thus, mercury, benzaldehyde, dibenzofuran, 2-butanone, acetone, carbon disulfide, and methyl acetate were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). One chemical (atrazine) was not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. This chemical was not identified as a Step 3A COPC but is discussed in **Section 7.6.**

Drainage Ditches. Four metals (aluminum, arsenic, iron, and mercury) exceeded ESVs based upon maximum detected concentrations in drainage ditch surface soil samples (**Table 7-17**). The ESVs for aluminum and iron were based upon soil pH; soil pH data are reported in **Table 7-16**. 2-Butanone and methyl acetate were detected in at least one surface soil sample but ESVs were not available. Thus, aluminum, arsenic, iron, mercury, 2-butanone, and methyl acetate were identified as Step 2 COPCs. Two metals (selenium and thallium) and two SVOCs (4-nitrophenol and atrazine) were not detected but maximum detection limits exceeded ESVs. These four chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL concentrations are also compared with ESVs in **Table 7-17**. Arsenic and mercury had HQs that exceeded 1 based upon the 95 percent UCL concentrations. Both of these metals exceeded the background UTLs. 2-Butanone and methyl acetate were detected but soil ESVs were not available. Thus, arsenic, mercury, 2-butanone, and methyl acetate were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). One chemical (atrazine) was not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. This chemical was not identified as a Step 3A COPC but is discussed in the uncertainty section (**Section 7.6**).

Area Outside of the Estimated Waste Boundary. Seven metals (aluminum, arsenic, copper, iron, manganese, mercury, and selenium) and two pesticides (alpha-chlordane and gamma-chlordane) exceeded ESVs based upon maximum detected concentrations in surface soil samples collected outside of the estimated waste boundary (**Table 7-18**). The ESVs for aluminum and iron were based upon soil pH; soil pH data are reported in **Table 7-16**. Benzaldehyde, 2-butanone, acetone, carbon disulfide, and methyl acetate were detected in at least one surface soil sample but ESVs were not available. Thus, aluminum, arsenic, copper, iron, manganese, mercury, selenium, alpha-chlordane, gamma-chlordane, benzaldehyde, 2-butanone, acetone, carbon disulfide, and methyl acetate were identified as Step 2 COPCs. One metal (thallium), one pesticide (toxaphene), and two SVOCs (4-nitrophenol and atrazine) were not detected but maximum detection limits exceeded ESVs. These four chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL concentrations are also compared with ESVs in **Table 7-18**. Only mercury had a HQ that exceeded 1 based upon the 95 percent UCL concentration; mercury also exceeded the background UTL. Benzaldehyde, 2-butanone, acetone, carbon disulfide, and methyl acetate were detected but soil ESVs were not available. Thus, mercury, benzaldehyde, 2-butanone, acetone, carbon disulfide, and methyl acetate were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). One chemical (atrazine) was not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. This chemical was not identified as a Step 3A COPC but is discussed in **Section 7.6**.

Area Inside the Estimated Waste Boundary. Three metals (aluminum, mercury, and selenium) exceeded ESVs based upon maximum detected concentrations in surface soil samples collected inside of the estimated waste boundary (**Table 7-19**). The ESVs for aluminum and iron were based upon soil pH; soil pH data are reported in **Table 7-16**. 2-Butanone and methyl acetate were detected in at least one surface soil sample but ESVs were not available. Thus, aluminum, mercury, selenium, 2-butanone, and methyl acetate were identified as Step 2 COPCs.

One metal (thallium) and two SVOCs (4-nitrophenol and atrazine) were not detected but maximum detection limits exceeded ESVs. These three chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL concentrations are also compared with ESVs in **Table 7-19**. Only mercury had a HQ that exceeded 1 based upon the 95 percent UCL concentration; mercury also exceeded the background UTL. 2-Butanone and methyl acetate were detected but soil ESVs were not available. Thus, mercury, 2-butanone, and methyl acetate were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). Two chemicals (4-nitrophenol and atrazine) were not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. These two chemicals were not identified as Step 3A COPCs but are discussed in **Section 7.6.**

Sludge Area. Three metals (aluminum, iron, and manganese) exceeded ESVs based upon maximum detected concentrations in surface soil samples collected from the sludge area (**Table 7-20**). The ESVs for aluminum and iron were based upon soil pH; soil pH data are reported in **Table 7-16**. Dibenzofuran, 2-butanone, and methyl acetate were detected in at least one surface soil sample but ESVs were not available. Thus, aluminum, iron, manganese, dibenzofuran, 2-butanone, and methyl acetate were identified as Step 2 COPCs. Two metals (selenium and thallium) and one SVOC (atrazine) were not detected but maximum detection limits exceeded ESVs. These three chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL concentrations in surface soil are also compared with ESVs in **Table 7-20**. The HQs for aluminum, iron, and manganese exceeded 1 based upon the 95 percent UCL concentration; however, none of these metals exceeded the background UTL. Dibenzofuran, 2-butanone, and methyl acetate were detected but soil ESVs were not available. Thus, dibenzofuran, 2-butanone, and methyl acetate were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). One chemical (atrazine) was not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. This chemical was not identified as a Step 3A COPC but is discussed in **Section 7.6**.

7.5.3.2 Subsurface Soil

Site-wide subsurface soil concentrations were first compared to soil ESVs for plants and soil invertebrates. Chemicals that exceeded ESVs based upon maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section 7.3.2**. Subsurface soil samples from the applicable depth range were only available for the area outside of the estimated waste boundary and the sludge area.

Site-Wide Evaluation. Site-wide maximum, mean, and 95 percent UCL soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table 7-21**. **Table 7-21** also contains a comparison against background UTLs for metals that exceeded soil ESVs based upon 95 percent UCL concentrations.

Four metals (aluminum, arsenic, iron, and mercury) exceeded ESVs based upon maximum detected concentrations (**Table 7-21**). The ESVs for aluminum and iron were based upon soil pH; soil pH data are reported in **Table 7-16**. 2-Butanone, carbon disulfide, methyl acetate, and 1,3,5-trinitrobenzene were detected in at least one subsurface soil sample but ESVs were not available. Thus, aluminum, arsenic, iron, mercury, 2-butanone, carbon disulfide, methyl acetate, and 1,3,5-trinitrobenzene were identified as Step 2 COPCs. Two metals (selenium and thallium), one pesticide (endrin ketone), and three SVOCs (4,6-dinitro-2-methylphenol, 4-nitrophenol, and atrazine) were not detected but maximum detection limits exceeded ESVs. These six chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL concentrations in subsurface soil are also compared with ESVs in **Table 7-21**. The HQs for arsenic and mercury exceeded 1 based upon the 95 percent UCL concentration. Both of these metals exceeded the background UTL. 2-Butanone, carbon disulfide, methyl acetate, and 1,3,5-trinitrobenzene were detected but soil ESVs were not available. Thus, arsenic, mercury, 2-butanone, carbon disulfide, methyl acetate, and 1,3,5-trinitrobenzene were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). One chemical (atrazine) was not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. This chemical was not identified as a Step 3A COPC but is discussed in **Section 7.6**.

Area Outside of the Estimated Waste Boundary. Four metals (aluminum, arsenic, iron, and mercury) exceeded ESVs based upon maximum detected concentrations in subsurface soil samples collected outside of the estimated

waste boundary (**Table 7-22**). The ESVs for aluminum and iron were based upon soil pH; soil pH data are reported in **Table 7-16**. 2-Butanone, carbon disulfide, methyl acetate, and 1,3,5-trinitrobenzene were detected in at least one subsurface soil sample but ESVs were not available. Thus, aluminum, arsenic, iron, mercury, 2-butanone, carbon disulfide, methyl acetate, and 1,3,5-trinitrobenzene were identified as Step 2 COPCs. Two metals (selenium and thallium), one pesticide (endrin ketone), and three SVOCs (4,6-dinitro-2-methylphenol, 4-nitrophenol, and atrazine) were not detected but maximum detection limits exceeded ESVs. These six chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL concentrations in subsurface soil are also compared with ESVs in **Table 7-22**. The HQs for arsenic and mercury exceeded 1 based upon the 95 percent UCL concentration. Both of these metals exceeded the background UTLs. 2-Butanone, carbon disulfide, methyl acetate, and 1,3,5-trinitrobenzene were detected but soil ESVs were not available. Thus, arsenic, mercury, 2-butanone, carbon disulfide, methyl acetate, and 1,3,5-trinitrobenzene were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). One chemical (atrazine) was not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. This chemical was not identified as a Step 3A COPC but is discussed in the uncertainty section (**Section 7.6**).

Sludge Area. Two metals (aluminum and iron) exceeded ESVs based upon maximum detected concentrations in subsurface soil samples collected from the sludge area (**Table 7-23**). The ESVs for aluminum and iron were based upon soil pH; soil pH data are reported in **Table 7-16**. Thus, aluminum and iron were identified as Step 2 COPCs. Two metals (selenium and thallium), one pesticide (endrin ketone), and one SVOC (atrazine) were not detected but maximum detection limits exceeded ESVs. These four chemicals were also identified as Step 2 COPCs.

Because only one subsurface soil sample was collected from the sludge area, mean and 95 percent UCL concentrations are not applicable. However, neither aluminum nor iron exceeded the background UTLs. Thus, no chemicals were identified as Step 3A COPCs for further risk evaluation. The four chemicals whose concentration based upon detection limits exceeded ESVs were not identified as Step 3A COPCs but are discussed in **Section 7.6.**

7.5.3.3 Groundwater

Although ecological receptors do not typically have direct exposure to groundwater, surface water ESVs were compared to site groundwater data in order to provide a conservative evaluation of the potential for significant contaminant transport via groundwater to the water bodies (York River, Felgates Creek, and Indian Field Creek) located downgradient of the site. As was done for soil, site-wide groundwater concentrations were first compared to ESVs. Chemicals that exceeded ESVs based upon maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section 7.3.2.** The groundwater evaluation provided in the ERA was a modified version of the initial (screening) groundwater evaluation method provided in the decision tree of USEPA (2008a). Modifications included the use of mean concentrations and dilution factors in Step 3A, consistent with the less conservative (but more realistic) assumptions applied as part of the Step 3A evaluation.

Although both total and dissolved groundwater data were included in the screening tables, only dissolved metals data were considered when selecting COPCs because chemicals in groundwater are most likely to travel dissolved in water rather than adhered to particles since they must travel through soil pores. Similarly, when groundwater discharges to a water body (at which time ecological exposures become possible), the bulk of the discharged chemicals are likely to be dissolved in water since the discharge must pass through the pores in the underlying sediments. Thus, the dissolved concentrations are likely to be more representative of what would be transported via the groundwater than the total concentrations. Once discharged, the dissolved metal fraction in water (filtered samples) is more representative of the bioavailable fraction to aquatic receptors than the total metal fraction (unfiltered samples) (USEPA, 1996a). This is reflected in how the most recent AWQC have been developed for many metals; that is, they are based upon the dissolved fraction (USEPA, 2009a).

Site-Wide Evaluation. Site-wide maximum, mean, and 95 percent UCL groundwater concentrations are compared to ESVs in **Table 7-24**. **Table 7-24** also contains a comparison against background UTLs for metals that exceeded ESVs based upon 95 percent UCL concentrations.

Two inorganic constituents (cyanide and manganese) and four pesticides (endosulfan I, gamma-chlordane, heptachlor epoxide, and methoxychlor) exceeded ESVs based upon maximum detected concentrations in

unfiltered samples (**Table 7-24**). Copper and manganese exceeded screening values based upon maximum detected concentrations in filtered samples. Trichlorofluoromethane (Freon-11) was detected in at least one groundwater sample but ESVs were not available. Thus, cyanide, copper, manganese, endosulfan I, gamma-chlordane, heptachlor epoxide, methoxychlor, and trichlorofluoromethane (Freon-11) were identified as Step 2 COPCs. Three total metals (aluminum, copper and silver), two dissolved metals (aluminum and silver), nine pesticides, seven PCB Aroclors, and 13 SVOCs were not detected but maximum detection limits exceeded ESVs. All of these chemicals were also identified as Step 2 COPCs.

The comparison of maximum undiluted groundwater concentrations with surface water ESVs is very conservative and likely significantly overestimates potential ecological exposures to sediment pore water in the biologically active zone and, especially, in the water column. The mean concentration is likely to provide a more realistic estimate of potential transport/exposure because groundwater discharge to the water bodies is expected to be diffuse rather than concentrated at particular points. Groundwater is also unlikely to be discharged undiluted. In the absence of site-specific dilution factors, Buchman (1999) recommends using a dilution factor of 10 to account for the dilution expected during migration to surface water bodies. Site-specific factors were not available so the "default" value of 10 was applied. Because groundwater from the site flows in three directions to three different water bodies, mean concentration scenarios on a site-wide basis are not applicable. Instead, these scenarios are conducted on a drainage-specific basis in the following subsections.

York River. Two inorganic constituents (cyanide and manganese) and four pesticides (endosulfan I, gamma-chlordane, heptachlor epoxide, and methoxychlor) exceeded ESVs based upon maximum detected concentrations in unfiltered samples collected from monitoring wells whose flow is toward the York River (**Table 7-25**). Copper and manganese exceeded screening values based upon maximum detected concentrations in filtered samples. Trichlorofluoromethane (Freon-11) was detected in at least one groundwater sample but ESVs were not available. Thus, cyanide, copper, manganese, endosulfan I, gamma-chlordane, heptachlor epoxide, methoxychlor, and trichlorofluoromethane (Freon-11) were identified as Step 2 COPCs. Three total metals (aluminum, copper and silver), two dissolved metals (aluminum and silver), nine pesticides, seven PCB Aroclors, and 13 SVOCs were not detected but maximum detection limits exceeded ESVs. All of these chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL chemical concentrations in groundwater are also compared with ESVs in **Table 7-25**. This comparison was done assuming no dilution as well as using a dilution factor of 10. The HQs for cyanide and dissolved copper exceeded 1 based upon the undiluted 95 percent UCL concentration. Copper also exceeded the background UTL (cyanide did not have a background UTL). The HQs for endosulfan I, gamma-chlordane, heptachlor epoxide, and methoxychlor also exceeded 1 based upon the undiluted 95 percent UCL concentration. All HQs were less than 1 assuming a dilution factor of 10 (**Table 7-25**). Trichlorofluoromethane (Freon-11) was detected but an ESV was not available. Thus, cyanide, copper, endosulfan I, gamma-chlordane, heptachlor epoxide, methoxychlor, and trichlorofluoromethane (Freon-11) were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). One metal (silver), nine pesticides, seven PCB Aroclors, and eight SVOCs were not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. These chemicals were not identified as Step 3A COPCs but are discussed in **Section 7.6**.

Felgates Creek. Only heptachlor epoxide exceeded ESVs based upon maximum detected concentrations in unfiltered samples collected from monitoring wells whose flow is toward Felgates Creek (**Table 7-26**). Thus, heptachlor epoxide was identified as a Step 2 COPC. Three inorganic constituents (copper, cyanide, and silver), 12 pesticides, seven PCB Aroclors, and 13 SVOCs were not detected but maximum detection limits exceeded ESVs. All of these chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL chemical concentrations in groundwater are also compared with ESVs in **Table 7-26**. This comparison was done assuming no dilution as well as using a dilution factor of 10. The HQ for heptachlor epoxide exceeded 1 based upon the undiluted 95 percent UCL concentration. All HQs were less than 1 assuming a dilution factor of 10 (**Table 7-26**). Thus, heptachlor epoxide was identified as a Step 3A COPC for further risk evaluation (**Section 7.5.5**). One metal (silver), cyanide, 12 pesticides, seven PCB Aroclors, and eight SVOCs were

not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. These chemicals were not identified as Step 3A COPCs but are discussed in **Section 7.6**.

Indian Field Creek. Two pesticides (endosulfan I and heptachlor epoxide) exceeded ESVs based upon maximum detected concentrations in unfiltered samples collected from monitoring wells whose flow is toward Indian Field Creek (**Table 7-27**). Thus, endosulfan I and heptachlor epoxide were identified as Step 2 COPCs. Three metals (aluminum, copper and silver), cyanide, 11 pesticides, seven PCB Aroclors, and 13 SVOCs were not detected but maximum detection limits exceeded ESVs. All of these chemicals were also identified as Step 2 COPCs.

Mean and 95 percent UCL chemical concentrations in groundwater are also compared with ESVs in **Table 7-27**. This comparison was done assuming no dilution as well as using a dilution factor of 10. The HQs for endosulfan I and heptachlor epoxide exceeded 1 based upon the undiluted 95 percent UCL concentration. All HQs were less than 1 assuming a dilution factor of 10 (**Table 7-27**). Thus, endosulfan I and heptachlor epoxide were identified as Step 3A COPCs for further risk evaluation (**Section 7.5.5**). One metal (silver), cyanide, 11 pesticides, seven PCB Aroclors, and eight SVOCs were not detected but 95 percent UCL concentrations based upon detection limits exceeded ESVs. These chemicals were not identified as Step 3A COPCs but are discussed in **Section 7.6.**

7.5.4 Terrestrial Food Web Exposures

In terrestrial habitats, Step 2 food web COPCs were selected by first comparing maximum surface soil concentrations with the lower of the available bird and mammal Eco-SSLs for the chemicals listed in **Table 7-3**. These Eco-SSL values are listed in **Table 7-28**. Chemicals that exceeded the Eco-SSLs based upon the maximum surface soil concentration were retained for site-specific food web modeling. Those that did not were not evaluated further for terrestrial food web exposures. Chemicals that were on the bioaccumulative chemicals list (**Table 7-3**) and did not have Eco-SSLs were automatically included in site-specific food web modeling. The final Step 2 food web COPCs were selected based upon a comparison of maximum exposure doses from site-specific food web modeling with the NOAEL-based ingestion TRV. Those chemicals with an exposure dose exceeding the NOAEL-based ingestion TRV were identified as Step 2 COPCs. For Step 3A, ingestion-based (food web) COPCs were based upon a comparison of mean and 95 percent UCL exposure doses with ingestion TRVs based upon the NOAEL, MATC, and LOAEL. An exceedance of the 95 percent UCL-based MATC was considered an unacceptable risk at Step 3A, although chemicals that exceed the MATC, but not the LOAEL, were discussed for possible risk management considerations.

The food web evaluation was conducted only on a site-wide basis because the spatial groupings used in the lower trophic level screening were interspersed, and several of them were limited in size. **Table 7-29** shows the results of the initial screening against bird and mammal Eco-SSLs. Those chemicals exceeding the Eco-SSLs based upon the maximum detected surface soil concentration (arsenic, cadmium, copper, lead, selenium, silver, zinc, 4,4'-dichlorodiphenyldichloroethane [DDD], 4,4'-DDT, dieldrin, and high molecular weight PAHs) were retained for site-specific food web modeling; the remaining chemicals with concentrations below the bird and mammal Eco-SSLs were not evaluated further for terrestrial food web exposures.

HQs based upon maximum exposure doses for each upper trophic level terrestrial receptor are listed in **Table 7-30** (calculations are shown in **Tables 7-31** through **7-36**)**.** Based upon a comparison to NOAELs, arsenic, cadmium, mercury, silver, and Aroclor-1221 had HQs exceeding 1 for one or more receptors. The exceedance for Aroclor-1221 was based upon maximum reporting limits. Ingestion TRVs were not available for any receptor for 4-bromophenyl-phenylether and 4-chlorophenyl-phenylether, neither of which was detected in surface soil.

HQs based upon 95 percent UCL exposure doses for each upper trophic level terrestrial receptor are listed in **Table 7-37** (calculations are shown in **Tables 7-38** through **7-43**)**.** Based upon a comparison to NOAELs, no chemical had an HQ exceeding 1. HQs based upon the arithmetic mean for each terrestrial upper trophic level receptor are listed in **Table 7-44** (calculations are shown in **Tables 7-45** through **7-50**)**.** Based upon a comparison to NOAELs, no chemical had an HQ exceeding 1. Because there were no exceedances based upon the MATC or LOAEL, no Step 3A COPCs were identified for terrestrial food web exposures and risks from this exposure pathway are considered acceptable.

7.5.5 Risk Evaluation

In this section, the various lines of evidence discussed in the previous section are integrated in order to evaluate the potential for unacceptable risks.

7.5.5.1 Terrestrial Habitats

Nine assessment endpoints were developed for terrestrial habitats at Site 24 (**Table 7-2**). Lines of evidence for terrestrial habitats included:

- Comparison of surface soil and shallow subsurface soil concentrations with ESVs
- Comparison of modeled dietary doses with ingestion TRVs
- Comparison of site surface soil concentrations with background concentrations

In surface soils, only mercury had a 95 percent UCL-based HQ that exceeded 1 on a site-wide basis. This was primarily due to one high concentration at A06SS-11 (4.7 mg/kg), a 1994 sample collected just outside of a small isolated waste area located in the northern portion of the site (**Figure 1-5**). There were no other surface soil samples in the immediate vicinity of this location, and there was no associated subsurface sample. The maximum concentrations of copper (exceeding the ESV) and silver (not exceeding the ESV) occurred in this sample, as did the only exceedances for pesticides (alpha-chlordane and gamma-chlordane). Excluding this sample, the mean and 95 percent UCL HQs on a site-wide basis do not exceed 1 and are thus acceptable. In subsurface soils, the 95 percent UCL HQ for mercury also exceeded 1 by a small amount (HQ of 1.37), although the mean HQ was less than 1 (0.70).

For arsenic in surface soils, the 95 percent UCL HQ did not exceed 1 on a site-wide basis but did for the drainage ditch sample grouping (although the mean HQ was less than 1). This was primarily due to one high concentration at YS24-SS31 (151 mg/kg), a 2010 sample collected along the western site boundary (**Figure 2-4**). A second high concentration (70.4 mg/kg) occurred in a nearby sample (YS24-SS04, in the outside the waste area spatial grouping) but another nearby sample (YS24-SS29) did not show elevated levels (2.1 mg/kg). There was no identified waste area in the immediate vicinity of these samples. In subsurface soils, the 95 percent UCL HQ for arsenic also exceeded 1 (although the mean HQ did not), largely driven by the sample at YS24-SB04 (at the same location as one of the two high surface samples; there was no associated subsurface sample at YS24-SS31). Ecological risks on a site-wide basis are acceptable.

A number of chemicals were detected in surface and/or subsurface soil samples that did not have ESVs. None of these chemicals presents an unacceptable ecological risk based upon the following:

- In surface soils, 2-butanone, acetone, carbon disulfide, and methyl acetate were detected at maximum concentrations (39.0, 3.00, 3.80, and 2,100 µg/kg, respectively) that were less than soil ESVs for other VOCs, which ranged from 173 to 64,000 µg/kg, averaging 5,675 µg/kg (**Table 7-10**). In subsurface soils, the maximum concentrations for 2-butanone, carbon disulfide, and methyl acetate (acetone was not detected) were 88.0, 2.80, and 680 µg/kg, respectively.
- Benzaldehyde, detected in 1 of 31 surface soil samples, had a maximum concentration (29.0 µg/kg) that was less than soil ESVs for other, similar SVOCs (**Table 7-10**).
- Dibenzofuran, detected in 1 of 50 surface soil samples, had a maximum concentration of 26.0 µg/kg (0.026 mg/kg). While there is little information regarding the potential toxicity to soil invertebrates and/or terrestrial plants following direct exposure to this chemical, available data suggest that the maximum observed concentration of dibenzofuran is too low to elicit adverse effects. In studies with oligochaete worms exposed to dibenzofuran-spiked soils, the resulting lethal concentration to 50 percent of the population (LC_{50}) (survival) and effect concentration to 50 percent of the population (EC_{50}) (reproduction) values were greater than 400 and 130 mg/kg, respectively (Sverdrup et al., 2002). In a similar study exposing collembolans (or springtails) to spiked soils, the LC_{50} and EC_{50} values were 50 and 23 mg/kg, respectively, for dibenzofuran (Sverdrup et al., 2001). Maximum surface soil concentrations for dibenzofuran were below these effect concentrations.

- 1,3,5-trinitrobenzene, detected in 1 of 14 subsurface soil samples, had a maximum concentration (660 µg/kg) that was less than soil ESVs for other, similar explosives (such as nitrobenzene ESV of 2,260 µg/kg [**Table 7-10**]).

No chemical had a MATC HQ exceeding 1 based upon the 95 percent UCL exposure dose. Thus, risks from terrestrial food web exposures are considered acceptable.

7.5.5.2 Aquatic Habitats

Cyanide, copper, endosulfan I, gamma-chlordane, heptachlor epoxide, methoxychlor, and trichlorofluoromethane (Freon-11) were identified as Step 3A COPCs for further risk evaluation in groundwater for the York River watershed. Only heptachlor epoxide was identified as a Step 3A COPC for the Felgates Creek watershed, and only endofulfan I and heptachlor epoxide were identified as Step 3A COPCs for the Indian Field Creek watershed (**Section 7.5.3.3**). None of these chemicals are likely to contribute to unacceptable ecological risks based upon the following:

- For copper, the 95 percent UCL HQ was just 1.20 (without dilution), the maximum HQ was only 1.35 (without dilution), and the maximum background ratio was just 1.40 (without dilution). The mean HQ (without dilution) was less than 1 (**Table 7-25**). Assuming a dilution factor of 10, the maximum HQ is well below 1.
- The ESV for cyanide is based upon free (bioavailable) cyanide, not total cyanide, while the measured groundwater concentrations are for total cyanide. Only a small fraction of the total cyanide will be present in bioavailable forms. Maximum, 95 percent UCL, and mean HQs (undiluted) were all very similar (approximately 5; **Table 7-25**). Assuming a dilution factor of 10, the maximum HQ is below 1 even if it is assumed that all of the cyanide is present in bioavailable forms.
- The maximum HQs for the four pesticide COPCs (endosulfan I, gamma-chlordane, heptachlor epoxide, and methoxychlor) were all less than 10 and were less than 2 for gamma-chlordane and methoxyclor (**Table 7-24**). Thus, assuming a dilution factor of 10, all of the maximum HQs are below 1. In addition, these pesticides are not likely due to a site-related release. None of these pesticides were identified as COPCs in either surface or subsurface soil. Only gamma-chlordane exceeded soil ESVs and in just 1 of 50 surface soil samples.
- Trichlorofluoromethane (Freon-11) was identified as a Step 3A COPC because it was detected and an ESV was not available. The maximum concentration of this chemical in groundwater (1.00 µg/L) was lower than marine-based screening values for other VOCs (**Table 7-11**).

Based upon the results of this evaluation, groundwater does not appear to be a significant transport medium for site-related constituents to the York River, Felgates Creek, or Indian Field Creek, and site-related constituents that might reach these water bodies via groundwater would not pose an unacceptable risk to aquatic biota.

7.5.6 Risk Summary and Conclusions

For terrestrial habitats, risks for lower trophic level receptors (plants and invertebrates) are generally acceptable on a site-wide basis, particularly given the current and future land use (training facility). However, a few small, isolated areas with high concentrations of mercury (area of sample A06SS-11) and arsenic (areas of samples YS24-SS31 and YS24-SS04) in surface soil were identified. In these areas, spatially-limited, localized risks to some lower trophic level receptors may exist. No chemical had a MATC HQ exceeding 1 based upon the 95 percent UCL exposure dose. Thus, risks from terrestrial food web exposures are acceptable. Groundwater does not appear to be a significant transport medium for site-related constituents to the York River, Felgates Creek, or Indian Field Creek, and site-related constituents in groundwater are unlikely to pose a significant risk to aquatic biota.

7.6 Uncertainties

Uncertainties are present in all risk assessments because of the limitations of the available data and the need to make certain assumptions and extrapolations based on incomplete information. In addition, the use of various models (such as uptake and food web exposures) carries with it some associated uncertainty as to how well the model reflects actual conditions. Since conservative assumptions were generally used in the exposure and effects

assessments, these uncertainties are more likely to result in an overestimation rather than an underestimation of the likelihood and magnitude of risks to ecological receptors.

The ERA uses “standard” methods and typical ranges of values for EPCs (maximum, mean, and 95 percent UCL), TRVs (NOAEL, MATC, LOAEL), and other parameters. This results in risk estimates that adequately span the risk range from extremely conservative (screening estimates) to central tendency (mean baseline estimates). The uncertainties associated with many of the particular inputs to the risk estimates are discussed below. What constitutes an unacceptable risk within this risk range is ultimately a risk management decision.

The uncertainties in this ERA are mainly attributable to the following factors:

- Reporting Limits - Reporting limits for some undetected analytes exceeded applicable ESVs in some media. **Table 7-51** summarizes these constituents, by medium, and reports both the ratio of the minimum and maximum reporting limits to the ESV as well as the ratio of the mean value (calculated using one-half of the reporting limit for each sample) to the ESV. Because these constituents were not detected, they are not known to be present on the site but the potential for unacceptable risks cannot be totally discounted because the reporting limits are higher than the ESVs. The magnitude of the ratios can be used to qualitatively evaluate the magnitude of the associated uncertainty (that is, higher ratios are indicative of a greater likelihood that chemicals are present at concentrations that exceed the screening value relative to lower ratios). In surface soil, four undetected chemicals exceeded reporting limits but the mean ratio was less than one for three of the four and approximately eight for the fourth. In subsurface soil, six undetected chemicals exceeded reporting limits but the mean ratio was less than one for five of the six and approximately eight for the sixth. In groundwater, mean reporting limits were generally less than 10 times ESVs.

  In summary, there were no chemicals with very high mean ratios, suggesting that the associated uncertainties are relatively low. Because standard analytical methods were used and the sample reporting limits were not elevated relative to the method reporting limits for the vast majority of samples and analytes, these uncertainties are considered acceptable and are unlikely to impact the conclusions of the ERA.

- Duplicate Analyses - When evaluating samples with field duplicates, the value used in the ERA was always the detect when one result was a detect and the duplicate was a non-detect, regardless of whether or not the non-detected value was higher. In these cases, the use of the detect has less uncertainty since it represents an actual measured value (versus an upper limit bound) and the two samples will have identical or similar reporting limits.

- Selection of COPCs - Chemicals without available ESVs for a medium were not retained as COPCs for risk evaluation unless they were detected. These uncertainties are unlikely to impact the conclusions of the ERA since these chemicals are not known to be present on the site.

- Ingestion Screening Values - Data on the toxicity of many chemicals to the receptor species were sparse or lacking, requiring the extrapolation of data from other wildlife species or from laboratory studies with non-wildlife species. This is a typical limitation and extrapolation for ERAs because so few wildlife species have been tested directly for most chemicals. The uncertainties associated with toxicity extrapolation were minimized through the selection of the most appropriate test species for which suitable toxicity data were available. The factors considered in selecting a test species to represent a receptor species included taxonomic relatedness, trophic level, foraging method, and similarity of diet. It is difficult to predict if these extrapolations would result in overestimating or underestimating potential risks.

  A second uncertainty related to the derivation of ingestion TRVs applies to metals. Most of the toxicological studies on which the ingestion TRVs for metals were based used forms of the metal (such as salts) that have high water solubility and high bioavailability to receptors. Because the analytical samples on which site-specific exposure estimates were based measured total metal concentration, regardless of form, and these highly bioavailable forms are expected to compose only a fraction of the total metal concentration, this is likely to result in an overestimation of potential risks for these chemicals but not to the extent that it would unduly impact the conclusions of the ERA.

A third source of uncertainty related to the derivation of ingestion-based TRVs applies to mercury and selenium. The ingestion-based TRVs used for these two metals were based on organometallic (methylated) forms. TRVs for inorganic forms tend to be substantially higher. Given that inorganic forms likely contribute significantly to the total mercury and selenium, the use of TRVs based upon organometallic forms tends to make the TRVs for these metals extremely conservative and likely overestimates potential risk.

- Chemical Mixtures - Information on the toxicological effects of chemical interactions is generally lacking for ecological receptors, which required (as is standard for ERAs) that the chemicals be evaluated on a compound-by-compound basis during the comparison to ESVs and TRVs. This could result in an underestimation of risk (if there are additive or synergistic effects among chemicals) or an overestimation of risks (if there are antagonistic effects among chemicals).

- Receptor Species Selection - Amphibians are typically selected as a receptor group only when freshwater aquatic or wetland habitats are present on, or in the contaminant transport pathways of, a site. This is not the case at Site 24 based upon the general lack of these habitats. However, some portions of the downgradient drainage areas may be utilized to some extent by more terrestrially-orientated amphibians in areas close to fresh water bodies (e.g., the upper reaches of Felgates and Indian Field Creeks). However, a formal assessment endpoint was not added for this receptor group because most nearby water bodies that contain water on a permanent or semi-permanent basis are brackish to saline.

  Reptiles were selected as receptors in the ERA, but were not evaluated quantitatively even when exposure pathways were likely to be complete. For food web exposures, this taxon was evaluated using other fauna (birds and mammals) as surrogates due to the general lack of taxon-specific toxicological data. This represents an uncertainty in the ERA. It was also assumed that any reptiles present on the site were not exposed to significantly higher concentrations of chemicals and were not more sensitive to chemicals than other receptor species evaluated in the ERA. This assumption was a source of uncertainty in the ERA. In addition, there is some uncertainty associated with the use of specific receptor species to represent larger groups of organisms (such as guilds).

- Calculation of the Total Exposure Dose - For most constituents, the contribution to the total dose from the inhalation route is insignificant for upper trophic level ecological receptors, especially relative to ingestion pathways. Thus, and given the general lack of data for evaluating this pathway (USEPA, 1999), the air pathway is not generally included in the total dose calculations for these ecological receptors. This could lead to an underestimation of the total dose to which these receptors are exposed. However, this underestimation is likely to be very small, especially given the relatively low frequency of detection and the low magnitude of the concentrations of volatile organic compounds (the constituents most likely to contribute to exposures via the inhalation route) in site soils. Exposure to chemicals present in surface soil via dermal contact may occur but is unlikely to represent a major exposure pathway for most upper trophic level receptors because fur or feathers minimize transfer of chemicals across dermal tissue. As for the inhalation pathway, there is a general lack of data for evaluating this pathway (USEPA, 1999) and not including this pathway in the calculation of the total dose is not likely to significantly underestimate total exposure, especially since incidental ingestion of surface soil during feeding, preening, or grooming activities is included in the total dose calculations.

- Food Web Exposure Modeling - Chemical concentrations in terrestrial food items (plants, soil invertebrates [earthworms], and small mammals) were modeled from measured surface soil concentrations and were not directly measured. The use of generic, literature-derived exposure models and BAFs introduces some uncertainty into the resulting estimates. The values selected and methodology employed were intended to provide a conservative (Step 2) or reasonable (Step 3A) estimate of potential food web exposure concentrations.

  Another source of uncertainty is the use of default assumptions for exposure parameters such as BCFs and BAFs. Although BCFs or BAFs for many bioaccumulative chemicals were readily available from the literature and were used in the ERA, the use of a default factor of 1.0 to estimate the concentration of some chemicals in receptor prey items is a source of uncertainty.

AUFs were assumed to equal 1. This is a conservative assumption since a significant percentage of each upper trophic level receptor species' time could be spent foraging off-site in unimpacted areas or in areas where chemical concentrations are expected to be significantly lower.

- Mean Versus Maximum Media Concentrations - As is typical in an ERA, a finite number of samples of environmental media are used to develop the exposure estimates. The maximum measured concentration provides a conservative estimate for immobile biota or those with a limited home range. The most realistic exposure estimates for mobile species with relatively large home ranges and for species populations (even those that are immobile or have limited home ranges) are those based upon the mean chemical concentrations in each medium to which these receptors are exposed. This is reflected in the wildlife dietary exposure models contained in the *Wildlife Exposure Factors Handbook* (USEPA, 1993a), which specify the use of average media concentrations. Given the mobility of the upper trophic level receptor species used in the ERA, the use of maximum chemical concentrations (rather than mean concentrations) in the SERA to estimate the exposure via food webs is very conservative. This conservatism was reduced to more realistic levels in the values selected for use in the BERA evaluation. The 95 percent UCL of the arithmetic mean was used quantitatively in the BERA portion of this ERA to represent the average exposure scenarios.
- Evaluation of the Groundwater Transport Pathway - Potential ecological risks from groundwater discharge to downgradient surface water bodies (Felgates Creek, Indian Field Creek, and the York River) were indirectly evaluated through a comparison of groundwater concentrations from site wells with surface water ecological screening values. Surface water, pore water, and/or sediment samples were not collected from these water bodies. The direct screening of groundwater data is normally the first step in such an evaluation (e.g., USEPA, 2008a), with surface water, pore water, and/or sediment samples only collected from the receiving water body or bodies if the initial screening indicates the potential for significant transport and exposure from this pathway. Based upon the results of the groundwater screening, potential ecological risks were not high enough to warrant further evaluation or sample collection in the receiving water bodies.
- Comparisons to Background Concentrations - Background concentrations were used to judge the site-relatedness of individual chemicals. If site concentrations were consistent with background levels, it was assumed that the concentrations were not related to known site-related source areas. There exists the possibility that concentrations below background were indeed site-related, rendering the assumption false. However, the potential impact of this possibility is minimal since chemicals at concentrations consistent with background should exhibit no different ecological effects than commonly occurring in areas not affected by releases, regardless of their source.

TABLE 7-1

Samples Used in the Ecological Risk Assessment

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Sample ID	Sample Date	Depth (inches)	Area
Surface Soil				
A06SS06	A06SS06-00	11/6/1994	0-6	Inside of Estimated Waste Boundary
A06SS07	A06SS07-00	11/6/1994	0-6	Outside of Estimated Waste Boundary
A06SS08	A06SS08-00	11/6/1994	0-6	Inside of Estimated Waste Boundary
A06SS08	A06SS08D-00	11/6/1994	0-6	Inside of Estimated Waste Boundary
A06SS09	A06SS09-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS10	A06SS10-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS11	A06SS11-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS12	A06SS12-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS12	A06SS12-00D	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS13	A06SS13-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS14	A06SS14-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS15	A06SS15-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS16	A06SS16-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06SS17	A06SS17-00	11/7/1994	0-6	Outside of Estimated Waste Boundary
A06TP01	A06TP01-01	11/16/1994	0-24	Inside of Estimated Waste Boundary
A06TP05	A06TP05-01	11/15/1994	0-24	Inside of Estimated Waste Boundary
24SS01	24SS01	9/9/1997	0-6	Outside of Estimated Waste Boundary
24SS02	24SS02	9/9/1997	0-6	Drainages
24SS03	24SS03	9/9/1997	0-6	Drainages
24SS03	24SS03D	9/9/1997	0-6	Drainages
24SS04	24SS04	9/9/1997	0-6	Drainages
24SS05	24SS05	9/9/1997	0-6	Outside of Estimated Waste Boundary
YS24-SO01	YS24-SS01-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary
YS24-SO01	YS24-SS01P-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary
YS24-SO02	YS24-SS02-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary
YS24-SO03	YS24-SS03-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary

TABLE 7-1

Samples Used in the Ecological Risk Assessment

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Sample ID	Sample Date	Depth (inches)	Area
YS24-GW/SO04	YS24-SS04-0410	4/15/2010	0-6	Outside of Estimated Waste Boundary
YS24-GW/SO05	YS24-SS05-0410	4/15/2010	0-6	Outside of Estimated Waste Boundary
YS24-GW/SO06	YS24-SS06-0410	4/15/2010	0-6	Outside of Estimated Waste Boundary
YS24-GW/SO07	YS24-SS07-0410	4/19/2010	0-6	Outside of Estimated Waste Boundary
YS24-GW/SO08	YS24-SS08-0410	4/15/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS09	YS24-SS09-0410	4/19/2010	0-6	Sludge Area
YS24-SS10	YS24-SS10-0410	4/20/2010	0-6	Sludge Area
YS24-SS11	YS24-SS11-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS11	YS24-SS11P-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS12	YS24-SS12-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS13	YS24-SS13-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS14	YS24-SS14-0410	4/16/2010	0-6	Inside of Estimated Waste Boundary
YS24-SS15	YS24-SS15-0410	4/16/2010	0-6	Inside of Estimated Waste Boundary
YS24-SS16	YS24-SS16-0410	4/15/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS17	YS24-SS17-0410	4/15/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS18	YS24-SS18-0410	4/15/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS19	YS24-SS19-0410	4/15/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS20	YS24-SS20-0410	4/15/2010	0-6	Inside of Estimated Waste Boundary
YS24-SS21	YS24-SS21-0410	4/16/2010	0-6	Outside of Estimated Waste Boundary
YS24-SS22	YS24-SS22-0410	4/14/2010	0-6	Drainages
YS24-SS23	YS24-SS23-0410	4/14/2010	0-6	Drainages
YS24-SS24	YS24-SS24-0410	4/14/2010	0-6	Drainages
YS24-SS25	YS24-SS25-0410	4/14/2010	0-6	Drainages
YS24-SS26	YS24-SS26-0410	4/14/2010	0-6	Drainages
YS24-SS26	YS24-SS26P-0410	4/14/2010	0-6	Drainages
YS24-SS27	YS24-SS27-0410	4/14/2010	0-6	Drainages
YS24-SS28	YS24-SS28-0410	4/14/2010	0-6	Drainages
YS24-SS29	YS24-SS29-0410	4/14/2010	0-6	Drainages

TABLE 7-1

Samples Used in the Ecological Risk Assessment

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Sample ID	Sample Date	Depth (inches)	Area
YS24-SS30	YS24-SS30-0410	4/14/2010	0-6	Drainages
YS24-SS31	YS24-SS31-0410	4/14/2010	0-6	Drainages
Subsurface Soil				
A06SB03	A06SB03-01	11/15/1994	12-36	Outside of Estimated Waste Boundary
A06SB03	A06SB03-01D	11/15/1994	12-36	Outside of Estimated Waste Boundary
A06SB04	A06SB04-01	11/4/1994	12-36	Outside of Estimated Waste Boundary
A06SB05	A06SB05-01	11/8/1994	12-36	Outside of Estimated Waste Boundary
A06SB06	A06SB06-01	11/6/1994	12-36	Outside of Estimated Waste Boundary
A06SB10	A06SB10-01	11/8/1994	12-36	Outside of Estimated Waste Boundary
YS24-SO01	YS24-SB01-0_5-2-0410	4/16/2010	6-24	Outside of Estimated Waste Boundary
YS24-SO02	YS24-SB02-0_5-2-0410	4/16/2010	6-24	Outside of Estimated Waste Boundary
YS24-SO02	YS24-SB02P-0_5-2-0410	4/16/2010	6-24	Outside of Estimated Waste Boundary
YS24-SO03	YS24-SB03-0_5-2-0410	4/16/2010	6-24	Outside of Estimated Waste Boundary
YS24-GW/SO04	YS24-SB04-0_5-2-0410	4/15/2010	6-24	Outside of Estimated Waste Boundary
YS24-GW/SO05	YS24-SB05-0_5-2-0410	4/15/2010	6-24	Outside of Estimated Waste Boundary
YS24-GW/SO06	YS24-SB06-0_5-2-0410	4/15/2010	6-24	Outside of Estimated Waste Boundary
YS24-GW/SO07	YS24-SB07-0_5-2-0410	4/19/2010	6-24	Outside of Estimated Waste Boundary
YS24-GW/SO08	YS24-SB08-0_5-2-0410	4/15/2010	6-24	Outside of Estimated Waste Boundary
YS24-GW/SB09	YS24-SB09-0_5-2-0410	4/19/2010	6-24	Sludge Area
Groundwater				
YS24-GW01	YS24-GW01D-0610	6/15/2010	Deep	York River Watershed
YS24-GW02	YS24-GW02D-0610	6/15/2010	Deep	Indian Field Creek Watershed
YS24-GW03	YS24-GW03S-0610	6/16/2010	Shallow	York River Watershed
YS24-GW03	YS24-GW03SP-0610	6/16/2010	Shallow	York River Watershed
YS24-GW/SO04	YS24-GW04S-0610	6/16/2010	Shallow	Felgates Creek Watershed
YS24-GW/SO05	YS24-GW05S-0610	6/16/2010	Shallow	York River Watershed
YS24-GW/SO06	YS24-GW06S-0610	6/16/2010	Shallow	York River Watershed

TABLE 7-1

Samples Used in the Ecological Risk Assessment

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Station ID	Sample ID	Sample Date	Depth (inches)	Area
YS24-GW/SO07	YS24-GW07S-0610	6/16/2010	Shallow	Indian Field Creek Watershed
YS24-GW/SO08	YS24-GW08S-0610	6/15/2010	Shallow	Indian Field Creek Watershed
YS24-GW/SB09	YS24-GW09S-0610	6/15/2010	Shallow	Felgates Creek Watershed
YS24-GW10	YS24-GW10S-0610	6/16/2010	Shallow	York River Watershed

Shaded cells indicate field duplicates

TABLE 7-2

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of terrestrial soil invertebrate communities	Are site-related chemical concentrations in surface soil sufficient to adversely effect soil invertebrate communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil screening values	Soil invertebrates
Survival, growth, and reproduction of terrestrial plant communities	Are site-related chemical concentrations in surface soil sufficient to adversely effect terrestrial plant communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil screening values	Terrestrial plants
Survival, growth, and reproduction of terrestrial reptile populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to terrestrial reptile populations?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil screening values	Reptiles
		Evidence of potential risk to other upper trophic level terrestrial receptors evaluated in the ERA (birds and mammals used as surrogates)	
Survival, growth, and reproduction of avian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants (seeds) from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based upon the NOAEL-LOAEL range indicate an effect	Mourning dove
Survival, growth, and reproduction of avian terrestrial invertivore/omnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based upon the NOAEL-LOAEL range indicate an effect	American robin
Survival, growth, and reproduction of avian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based upon the NOAEL-LOAEL range indicate an effect	Red-tailed hawk

TABLE 7-2

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of mammalian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume plants from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based upon the NOAEL-LOAEL range indicate an effect	Meadow vole
Survival, growth, and reproduction of mammalian terrestrial invertivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based upon the NOAEL-LOAEL range indicate an effect	Short-tailed shrew
Survival, growth, and reproduction of mammalian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based upon the NOAEL-LOAEL range indicate an effect	Red fox

TABLE 7-3

Bioaccumulative Chemicals List and Log K_{ow} Values

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Log K_{ow} Range	Selected log K_{ow}	Reference
Metals			
Arsenic	-- - --	--	--
Cadmium	-- - --	--	--
Chromium[1]	-- - --	--	--
Copper	-- - --	--	--
Lead	-- - --	--	--
Mercury[2]	-- - --	--	--
Nickel	-- - --	--	--
Selenium	-- - --	--	--
Silver	-- - --	--	--
Zinc	-- - --	--	--
Polychlorinated Biphenyls[3]			
Aroclor-1016	Not reported	5.60	Sample et al. 1996
Aroclor-1221	Not reported	4.70	Jones et al. 1997
Aroclor-1232	Not reported	5.10	Jones et al. 1997
Aroclor-1242	Not reported	5.60	Jones et al. 1997
Aroclor-1248	Not reported	6.20	Jones et al. 1997
Aroclor-1254	Not reported	6.50	Jones et al. 1997
Aroclor-1260	Not reported	6.80	Jones et al. 1997
Pesticides			
4,4'-DDD	5.90 - 6.65	6.10	USEPA 1995a
4,4'-DDE	5.63 - 6.96	6.76	USEPA 1995a
4,4'-DDT	5.56 - 7.01	6.53	USEPA 1995a
Aldrin	5.11 - 7.50	6.50	USEPA 1995a
alpha-BHC	3.75 - 3.81	3.80	USEPA 1995a
alpha-Chlordane[4]	5.80 - 6.41	6.32	USEPA 1995a
beta-BHC	3.75 - 3.84	3.81	USEPA 1995a
delta-BHC	Not reported	4.10	USEPA 1996b
Dieldrin	3.63 - 6.20	5.37	USEPA 1995a

TABLE 7-3

Bioaccumulative Chemicals List and Log K_{ow} Values

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Log K_{ow} Range	Selected log K_{ow}	Reference
Endosulfan I	3.55 - 3.85	3.83	USEPA 1995a
Endosulfan II	3.62 - 4.52	4.52	USEPA 1995a
Endrin	2.92 - 5.20	5.06	USEPA 1995a
gamma-BHC (Lindane)	3.61 - 3.90	3.73	USEPA 1995a
gamma-Chlordane[4]	5.80 - 6.41	6.32	USEPA 1995a
Heptachlor	4.93 - 6.26	6.26	USEPA 1995a
Heptachlor epoxide	3.50 - 5.40	5.00	USEPA 1995a
Methoxychlor	4.20 - 5.60	5.08	USEPA 1995a
Toxaphene	4.33 - 5.56	5.50	USEPA 1995a
Volatile and Semivolatile Organic Compounds			
1,1,2,2-Tetrachloroethane[5]	2.31 - 2.64	2.39	USEPA 1995a
1,2,4,5-Tetrachlorobenzene	4.51 - 4.83	4.64	USEPA 1995a
1,2,4-Trichlorobenzene	3.89 - 4.23	4.01	USEPA 1995a
1,2-Dichlorobenzene	3.20 - 3.61	3.43	USEPA 1995a
1,3-Dichlorobenzene	Not reported	3.50	USEPA 1996b
1,4-Dichlorobenzene	3.26 - 3.62	3.42	USEPA 1995a
4-Bromophenyl-phenylether	4.89 - 5.24	5.00	USEPA 1995a
4-Chlorophenyl-phenylether	4.08 - 5.09	4.95	USEPA 1995a
Acenaphthene	3.77 - 4.49	3.92	USEPA 1995a
Acenaphthylene	Not reported	4.10	USEPA 1996b
Anthracene	4.44 - 4.80	4.55	USEPA 1995a
Benzo(a)anthracene	5.61 - 5.79	5.70	USEPA 1995a
Benzo(a)pyrene	5.98 - 6.34	6.11	USEPA 1995a
Benzo(b)fluoranthene	5.79 - 6.40	6.20	USEPA 1995a
Benzo(g,h,i)perylene	6.58 - 7.05	6.70	USEPA 1995a
Benzo(k)fluoranthene	6.12 - 6.27	6.20	USEPA 1995a
Chrysene	5.41 - 5.79	5.70	USEPA 1995a
Dibenz(a,h)anthracene	6.50 - 6.88	6.69	USEPA 1995a
Fluoranthene	4.84 - 5.39	5.12	USEPA 1995a
Fluorene	4.04 - 4.40	4.21	USEPA 1995a

TABLE 7-3

Bioaccumulative Chemicals List and Log K_{ow} Values

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Log K_{ow} Range	Selected log K_{ow}	Reference
Hexachlorobenzene	5.23 - 6.92	5.89	USEPA 1995a
Hexachlorobutadiene	4.74 - 5.16	4.81	USEPA 1995a
Hexachlorocyclopentadiene	5.05 - 5.51	5.39	USEPA 1995a
Hexachloroethane	3.82 - 4.14	4.00	USEPA 1995a
Indeno(1,2,3-cd)pyrene	6.58 - 6.72	6.65	USEPA 1995a
Pentachlorophenol	5.01 - 5.24	5.09	USEPA 1995a
Phenanthrene	4.37 - 4.57	4.55	USEPA 1995a
Pyrene	4.76 - 5.52	5.11	USEPA 1995a

[1] Listed as chromium VI but applied to total chromium

[2] Listed as methylmercury but applied to total mercury

[3] PCB congeners 8, 18, 28, 44, 52, 66, 77, 81, 101, 105, 118, 126, 128, 138, 153, 156, 169, 170, 180, 187, 195, 206, and 209 are also listed in USEPA (2000)

[4] Listed as "chlordane"

[5] Listed as "tetrachloroethane"

TABLE 7-4

Soil Bioconcentration Factors For Plants (Dry Weight)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table 7-5	--	--	See Table 7-5	--
Cadmium	--	See Table 7-5	--	--	See Table 7-5	--
Chromium	0.084	90th percentile	Bechtel Jacobs 1998a	0.041	Median	Bechtel Jacobs 1998a; USEPA 2007j
Copper	--	See Table 7-5	--	--	See Table 7-5	--
Lead	--	See Table 7-5	--	--	See Table 7-5	--
Mercury	--	See Table 7-5	--	--	See Table 7-5	--
Nickel	--	See Table 7-5	--	--	See Table 7-5	--
Selenium	--	See Table 7-5	--	--	See Table 7-5	--
Silver	0.037	90th percentile	Bechtel Jacobs 1998a	0.014	Median	Bechtel Jacobs 1998a; USEPA 2007j
Zinc	--	See Table 7-5	--	--	See Table 7-5	--
Pesticides						
4,4'-DDD	--	See Table 7-5	--	--	See Table 7-5	--
4,4'-DDE	--	See Table 7-5	--	--	See Table 7-5	--
4,4'-DDT	--	See Table 7-5	--	--	See Table 7-5	--
Aldrin	0.139	Calculated[1]	USEPA 2007j	0.139	Calculated	USEPA 2007j
alpha-BHC	1.735	Calculated	USEPA 2007j	1.735	Calculated	USEPA 2007j
alpha-Chlordane	0.165	Calculated	USEPA 2007j	0.165	Calculated	USEPA 2007j
beta-BHC	1.719	Calculated	USEPA 2007j	1.719	Calculated	USEPA 2007j
delta-BHC	1.311	Calculated	USEPA 2007j	1.311	Calculated	USEPA 2007j
Dieldrin	0.41	Median	USEPA 2007j	0.41	Median	USEPA 2007j
Endosulfan I	1.687	Calculated	USEPA 2007j	1.687	Calculated	USEPA 2007j
Endosulfan II	0.886	Calculated	USEPA 2007j	0.886	Calculated	USEPA 2007j
Endrin	0.535	Calculated	USEPA 2007j	0.535	Calculated	USEPA 2007j
gamma-BHC (Lindane)	1.852	Calculated	USEPA 2007j	1.852	Calculated	USEPA 2007j

TABLE 7-4

Soil Bioconcentration Factors For Plants (Dry Weight)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
gamma-Chlordane	0.165	Calculated	USEPA 2007j	0.165	Calculated	USEPA 2007j
Heptachlor	0.174	Calculated	USEPA 2007j	0.174	Calculated	USEPA 2007j
Heptachlor epoxide	0.566	Calculated	USEPA 2007j	0.566	Calculated	USEPA 2007j
Methoxychlor	0.525	Calculated	USEPA 2007j	0.525	Calculated	USEPA 2007j
Toxaphene	0.355	Calculated	USEPA 2007j	0.355	Calculated	USEPA 2007j
Polychlorinated Biphenyls						
Aroclor-1016	0.323	Calculated	USEPA 2007j	0.323	Calculated	USEPA 2007j
Aroclor-1221	0.749	Calculated	USEPA 2007j	0.749	Calculated	USEPA 2007j
Aroclor-1232	0.515	Calculated	USEPA 2007j	0.515	Calculated	USEPA 2007j
Aroclor-1242	0.323	Calculated	USEPA 2007j	0.323	Calculated	USEPA 2007j
Aroclor-1248	0.184	Calculated	USEPA 2007j	0.184	Calculated	USEPA 2007j
Aroclor-1254	0.139	Calculated	USEPA 2007j	0.139	Calculated	USEPA 2007j
Aroclor-1260	0.105	Calculated	USEPA 2007j	0.105	Calculated	USEPA 2007j
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	1.000	Assumed	--	1.000	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.792	Calculated	USEPA 2007j	0.792	Calculated	USEPA 2007j
1,2,4-Trichlorobenzene	1.426	Calculated	USEPA 2007j	1.426	Calculated	USEPA 2007j
1,2-Dichlorobenzene	2.452	Calculated	USEPA 2007j	2.452	Calculated	USEPA 2007j
1,3-Dichlorobenzene	2.296	Calculated	USEPA 2007j	2.296	Calculated	USEPA 2007j
1,4-Dichlorobenzene	2.475	Calculated	USEPA 2007j	2.475	Calculated	USEPA 2007j
4-Bromophenyl-phenylether	0.566	Calculated	USEPA 2007j	0.566	Calculated	USEPA 2007j
4-Chlorophenyl-phenylether	0.593	Calculated	USEPA 2007j	0.593	Calculated	USEPA 2007j
Acenaphthene	--	See Table 7-5	--	--	See Table 7-5	--
Acenaphthylene	--	See Table 7-5	--	--	See Table 7-5	--
Anthracene	--	See Table 7-5	--	--	See Table 7-5	--
Benzo(a)anthracene	--	See Table 7-5	--	--	See Table 7-5	--
Benzo(a)pyrene	--	See Table 7-5	--	--	See Table 7-5	--
Benzo(b)fluoranthene	0.31	Median	USEPA 2007j	0.31	Median	USEPA 2007j

TABLE 7-4

Soil Bioconcentration Factors For Plants (Dry Weight)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Benzo(g,h,i)perylene	--	See Table 7-5	--	--	See Table 7-5	--
Benzo(k)fluoranthene	--	See Table 7-5	--	--	See Table 7-5	--
Chrysene	--	See Table 7-5	--	--	See Table 7-5	--
Dibenz(a,h)anthracene	0.13	Median	USEPA 2007j	0.13	Median	USEPA 2007j
Fluoranthene	0.50	Median	USEPA 2007j	0.50	Median	USEPA 2007j
Fluorene	--	See Table 7-5	--	--	See Table 7-5	--
Hexachlorobenzene	0.246	Calculated	USEPA 2007j	0.246	Calculated	USEPA 2007j
Hexachlorobutadiene	0.675	Calculated	USEPA 2007j	0.675	Calculated	USEPA 2007j
Hexachlorocyclopentadiene	0.393	Calculated	USEPA 2007j	0.393	Calculated	USEPA 2007j
Hexachloroethane	1.439	Calculated	USEPA 2007j	1.439	Calculated	USEPA 2007j
Indeno(1,2,3-cd)pyrene	0.11	Median	USEPA 2007j	0.11	Median	USEPA 2007j
Pentachlorophenol	5.93	Median	USEPA 2007j	5.93	Median	USEPA 2007j
Phenanthrene	--	See Table 7-5	--	--	See Table 7-5	--
Pyrene	0.72	Median	USEPA 2007j	0.72	Median	USEPA 2007j

[1] Calculated as described in the text using the "selected" log K_{ow} from Table 7-3

TABLE 7-5

Bioconcentration/Bioaccumulation Factor Models (Dry Weight)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Plants[1]	Reference	Soil Invertebrates[2]	Reference	Small Mammal Herbivores[3]	Reference	Small Mammal Insectivores[3]	Reference
Metals								
Arsenic	$C_p = e^{(-1.992 + 0.564(\ln Cs))}$	Bechtel Jacobs 1998a	$C_w = e^{(-1.421 + 0.706(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_m = e^{(-5.6531 + 1.1382(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-4.8471 + 0.8188(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Cadmium	$C_p = e^{(-0.476 + 0.546(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(2.114 + 0.795(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_m = e^{(-1.2571 + 0.4723(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(0.8150 + 0.9638(\ln Cs))}$	Sample et al. 1998b
Chromium	--	--	--	--	$C_m = e^{(-1.4599 + 0.7338(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-1.4599 + 0.7338(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Copper	$C_p = e^{(0.669 + 0.394(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(1.675 + 0.264(\ln Cs))}$	Sample et al. 1998a	$C_m = e^{(2.0420 + 0.1444(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(2.1042 + 0.1783(\ln Cs))}$	Sample et al. 1998b
Lead	$C_p = e^{(-1.328 + 0.561(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(-0.218 + 0.807(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_m = e^{(-0.6114 + 0.5181(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(0.4819 + 0.4869(\ln Cs))}$	Sample et al. 1998b
Mercury	$C_p = e^{(-0.996 + 0.544(\ln Cs))}$	Bechtel Jacobs 1998a	--	--	--	--	--	--
Nickel	$C_p = e^{(-2.224 + 0.748(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	--	--	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Selenium	$C_p = e^{(-0.678 + 1.104(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(-0.075 + 0.733(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Zinc	$C_p = e^{(1.575 + 0.555(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(4.449 + 0.328(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_m = e^{(4.3632 + 0.0706(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(4.2479 + 0.1324(\ln Cs))}$	Sample et al. 1998b
Pesticides								
4,4'-DDD	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(1.1613 + 0.6975(\ln Cs))}$	USEPA 2007j	--	--	--	--
4,4'-DDE	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(2.4771 + 0.8804(\ln Cs))}$	USEPA 2007j	--	--	--	--
4,4'-DDT	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(2.1247 + 0.8689(\ln Cs))}$	USEPA 2007j	--	--	--	--
PCBs								
Aroclor-1016	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--	--	--

TABLE 7-5

Bioconcentration/Bioaccumulation Factor Models (Dry Weight)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Plants[1]	Reference	Soil Invertebrates[2]	Reference	Small Mammal Herbivores[3]	Reference	Small Mammal Insectivores[3]	Reference
Aroclor-1221	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--	--	--
Aroclor-1232	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--	--	--
Aroclor-1242	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--	--	--
Aroclor-1248	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--	--	--
Aroclor-1254	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--	--	--
Aroclor-1260	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--	--	--
PAHs								
Acenaphthene	$C_p = e^{(-5.562 - 0.8556(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Acenaphthylene	$C_p = e^{(-1.144 + 0.791(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Anthracene	$C_p = e^{(-0.9887 + 0.7784(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Benzo(a)anthracene	$C_p = e^{(-2.7078 + 0.5944(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Benzo(a)pyrene	$C_p = e^{(-2.0615 + 0.9750(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Benzo(g,h,i)perylene	$C_p = e^{(-0.9313 + 1.1829(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Benzo(k)fluoranthen	$C_p = e^{(-2.1579 + 0.8595(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Chrysene	$C_p = e^{(-2.7078 + 0.5944(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Fluorene	$C_p = e^{(-5.562 - 0.8556(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--
Phenanthrene	$C_p = e^{(-0.1665 + 0.6203(\ln Cs))}$	USEPA 2007j	--	--	--	--	--	--

[1] Where C_p = Concentration in aboveground portion of plant (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry v

[2] Where C_w = Concentration in earthworm (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

[3] Where C_m = Concentration in whole-body small mammal (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

TABLE 7-6

Soil Bioaccumulation Factors For Soil Invertebrates (Dry Weight)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	see Table 7-5	--	--	see Table 7-5	--
Cadmium	--	see Table 7-5	--	--	see Table 7-5	--
Chromium	3.162	90th percentile	Sample et al. 1998a	0.320	Geometric mean	Sample et al. 1998a
Copper	--	see Table 7-5	--	--	see Table 7-5	--
Lead	--	see Table 7-5	--	--	see Table 7-5	--
Mercury	20.63	90th percentile	Sample et al. 1998a	1.186	Geometric mean	Sample et al. 1998a
Nickel	4.730	90th percentile	Sample et al. 1998a	1.656	Arithmetic mean	Sample et al. 1998a
Selenium	--	see Table 7-5	--	--	see Table 7-5	--
Silver	15.34	90th percentile	Sample et al. 1998a	2.045	Median	Sample et al. 1998a; USEPA 2007j
Zinc	--	see Table 7-5	--	--	see Table 7-5	--
Pesticides						
4,4'-DDD	--	see Table 7-5	--	--	see Table 7-5	--
4,4'-DDE	--	see Table 7-5	--	--	see Table 7-5	--
4,4'-DDT	--	see Table 7-5	--	--	see Table 7-5	--
Aldrin	3.30	Mean	Edwards and Bohlen 1992	3.30	Mean	Edwards and Bohlen 1992
alpha-BHC	1.00	Assumed	--	1.00	Assumed	--
alpha-Chlordane	4.00	Mean	Edwards and Bohlen 1992	4.00	Mean	Edwards and Bohlen 1992
beta-BHC	1.00	Assumed	--	1.00	Assumed	--
delta-BHC	1.00	Assumed	--	1.00	Assumed	--
Dieldrin	14.7	Median	USEPA 2007j	14.7	Median	USEPA 2007j
Endosulfan I	1.00	Assumed	--	1.00	Assumed	--
Endosulfan II	1.00	Assumed	--	1.00	Assumed	--
Endrin	3.60	Mean	Edwards and Bohlen 1992	3.60	Mean	Edwards and Bohlen 1992
gamma-BHC (Lindane)	26.6	Maximum	Romijn et al. 1994	13.7	Mean	Romijn et al. 1994
gamma-Chlordane	4.00	Mean	Edwards and Bohlen 1992	4.00	Mean	Edwards and Bohlen 1992
Heptachlor	3.00	Mean	Edwards and Bohlen 1992	3.00	Mean	Edwards and Bohlen 1992

TABLE 7-6

Soil Bioaccumulation Factors For Soil Invertebrates (Dry Weight)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Heptachlor epoxide	10.0	Mean	Beyer and Gish 1980	10.0	Mean	Beyer and Gish 1980
Methoxychlor	1.00	Assumed	--	1.00	Assumed	--
Toxaphene	1.00	Assumed	--	1.00	Assumed	--
Polychlorinated Biphenyls						
Aroclor-1016	--	see Table 7-5	--	--	see Table 7-5	--
Aroclor-1221	--	see Table 7-5	--	--	see Table 7-5	--
Aroclor-1232	--	see Table 7-5	--	--	see Table 7-5	--
Aroclor-1242	--	see Table 7-5	--	--	see Table 7-5	--
Aroclor-1248	--	see Table 7-5	--	--	see Table 7-5	--
Aroclor-1254	--	see Table 7-5	--	--	see Table 7-5	--
Aroclor-1260	--	see Table 7-5	--	--	see Table 7-5	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	1.00	Assumed	--	1.00	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.50	Mean	Beyer 1996	0.50	Mean	Beyer 1996
1,2,4-Trichlorobenzene	0.56	Mean	Beyer 1996	0.56	Mean	Beyer 1996
1,2-Dichlorobenzene	1.00	Assumed	--	1.00	Assumed	--
1,3-Dichlorobenzene	1.00	Assumed	--	1.00	Assumed	--
1,4-Dichlorobenzene	1.00	Assumed	--	1.00	Assumed	--
4-Bromophenyl-phenylethe	1.00	Assumed	--	1.00	Assumed	--
4-Chlorophenyl-phenylethe	1.00	Assumed	--	1.00	Assumed	--
Acenaphthene	0.30	Median	Beyer and Stafford 1993	0.30	Median	Beyer and Stafford 1993
Acenaphthylene	0.22	Median	Beyer and Stafford 1993	0.22	Median	Beyer and Stafford 1993
Anthracene	0.32	Median	Beyer and Stafford 1993	0.32	Median	Beyer and Stafford 1993
Benzo(a)anthracene	0.27	Median	Beyer and Stafford 1993	0.27	Median	Beyer and Stafford 1993
Benzo(a)pyrene	0.34	Median	Beyer and Stafford 1993	0.34	Median	Beyer and Stafford 1993
Benzo(b)fluoranthene	0.21	Median	Beyer and Stafford 1993	0.21	Median	Beyer and Stafford 1993
Benzo(g,h,i)perylene	0.15	Median	Beyer and Stafford 1993	0.15	Median	Beyer and Stafford 1993
Benzo(k)fluoranthene	0.21	Median	Beyer and Stafford 1993	0.21	Median	Beyer and Stafford 1993

TABLE 7-6

Soil Bioaccumulation Factors For Soil Invertebrates (Dry Weight)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Chrysene	0.44	Median	Beyer and Stafford 1993	0.44	Median	Beyer and Stafford 1993
Dibenz(a,h)anthracene	0.49	Median	Beyer and Stafford 1993	0.49	Median	Beyer and Stafford 1993
Fluoranthene	0.37	Median	Beyer and Stafford 1993	0.37	Median	Beyer and Stafford 1993
Fluorene	0.20	Median	Beyer and Stafford 1993	0.20	Median	Beyer and Stafford 1993
Hexachlorobenzene	1.69	Mean	Beyer 1996	1.69	Mean	Beyer 1996
Hexachlorobutadiene	1.00	Assumed	--	1.00	Assumed	--
Hexachlorocyclopentadiene	1.00	Assumed	--	1.00	Assumed	--
Hexachloroethane	1.00	Assumed	--	1.00	Assumed	--
Indeno(1,2,3-cd)pyrene	0.41	Median	Beyer and Stafford 1993	0.41	Median	Beyer and Stafford 1993
Pentachlorophenol	14.6	Median	USEPA 2007j	14.6	Median	USEPA 2007j
Phenanthrene	0.28	Median	Beyer and Stafford 1993	0.28	Median	Beyer and Stafford 1993
Pyrene	0.39	Median	Beyer and Stafford 1993	0.39	Median	Beyer and Stafford 1993

TABLE 7-7a

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Herbivores

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	see Table 7-5	--	--	see Table 7-5	--
Cadmium	--	see Table 7-5	--	--	see Table 7-5	--
Chromium	--	see Table 7-5	--	--	see Table 7-5	--
Copper	--	see Table 7-5	--	--	see Table 7-5	--
Lead	--	see Table 7-5	--	--	see Table 7-5	--
Mercury	0.192	90th percentile	Sample et al. 1998b	0.067	Geometric mean	Sample et al. 1998b
Nickel	--	see Table 7-5	--	--	see Table 7-5	--
Selenium	--	see Table 7-5	--	--	see Table 7-5	--
Silver	0.007	90th percentile	Sample et al. 1998b	0.006	Geometric mean	Sample et al. 1998b
Zinc	--	see Table 7-5	--	--	see Table 7-5	--
Pesticides						
4,4'-DDD	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
4,4'-DDE	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
4,4'-DDT	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aldrin	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
alpha-BHC	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
alpha-Chlordane	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
beta-BHC	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
delta-BHC	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Dieldrin	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Endosulfan I	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Endosulfan II	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Endrin	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
gamma-BHC (Lindane)	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
gamma-Chlordane	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Heptachlor	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Heptachlor epoxide	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3

TABLE 7-7a

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Herbivores

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Methoxychlor	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Toxaphene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1221	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1232	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1242	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1248	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1254	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1260	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,2,4,5-Tetrachlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,2,4-Trichlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,2-Dichlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,3-Dichlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,4-Dichlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
4-Bromophenyl-phenylether	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
4-Chlorophenyl-phenylether	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Acenaphthene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Acenaphthylene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Anthracene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(a)anthracene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(a)pyrene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(b)fluoranthene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(g,h,i)perylene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(k)fluoranthene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Chrysene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j

TABLE 7-7a

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Herbivores

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Dibenz(a,h)anthracene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Fluoranthene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Fluorene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Hexachlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Hexachlorobutadiene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Hexachlorocyclopentadiene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Hexachloroethane	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Indeno(1,2,3-cd)pyrene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Pentachlorophenol	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Phenanthrene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Pyrene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j

NA - Not Available

TABLE 7-7b

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Insectivores

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	see Table 7-5	--	--	see Table 7-5	--
Cadmium	--	see Table 7-5	--	--	see Table 7-5	--
Chromium	--	see Table 7-5	--	--	see Table 7-5	--
Copper	--	see Table 7-5	--	--	see Table 7-5	--
Lead	--	see Table 7-5	--	--	see Table 7-5	--
Mercury	0.192	90th percentile	Sample et al. 1998b	0.067	Geometric mean	Sample et al. 1998b
Nickel	--	see Table 7-5	--	--	see Table 7-5	--
Selenium	--	see Table 7-5	--	--	see Table 7-5	--
Silver	0.501	90th percentile	Sample et al. 1998b	0.036	Geometric mean	Sample et al. 1998b
Zinc	--	see Table 7-5	--	--	see Table 7-5	--
Pesticides						
4,4'-DDD	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
4,4'-DDE	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
4,4'-DDT	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aldrin	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
alpha-BHC	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
alpha-Chlordane	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
beta-BHC	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
delta-BHC	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Dieldrin	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Endosulfan I	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Endosulfan II	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Endrin	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
gamma-BHC (Lindane)	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
gamma-Chlordane	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Heptachlor	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Heptachlor epoxide	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3

TABLE 7-7b

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Insectivores

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Methoxychlor	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Toxaphene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1221	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1232	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1242	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1248	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1254	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Aroclor-1260	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,2,4,5-Tetrachlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,2,4-Trichlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,2-Dichlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,3-Dichlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
1,4-Dichlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
4-Bromophenyl-phenylether	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
4-Chlorophenyl-phenylether	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Acenaphthene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Acenaphthylene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Anthracene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(a)anthracene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(a)pyrene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(b)fluoranthene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(g,h,i)perylene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Benzo(k)fluoranthene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Chrysene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j

TABLE 7-7b

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Insectivores

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Dibenz(a,h)anthracene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Fluoranthene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Fluorene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Hexachlorobenzene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Hexachlorobutadiene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Hexachlorocyclopentadiene	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Hexachloroethane	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Indeno(1,2,3-cd)pyrene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Pentachlorophenol	NA	--	See Section 7.3.3.3	NA	--	See Section 7.3.3.3
Phenanthrene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j
Pyrene	0.0	Assumed	USEPA 2007j	0.0	Assumed	USEPA 2007j

NA - Not Available

TABLE 7-8

Exposure Parameters for Upper Trophic Level Ecological Receptors - Screening

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Dietary Composition (percent)				Soil Ingestion (percent)	
	Value	Reference	Value	Reference	Value	Reference	Terrestrial Plants	Soil Invertebrates	Small Mammals	Reference	Value	Reference
Birds												
American robin (omnivore)	0.0635	USEPA 1993	0.0129	allometric equation (USEPA 1993)[1]	0.0074	Levey and Karasov 1989	51.9	43.5	0	Martin et al. 1951	4.6	Sample and Suter 1994
American robin (invertivore)	0.0635	USEPA 1993	0.0129	allometric equation (USEPA 1993)[1]	0.0074	Levey and Karasov 1989	0	95.4	0	exclusive diet	4.6	Sample and Suter 1994
Mourning dove	0.1050	Tomlinson et al. 1994	0.0175	allometric equation (USEPA 1993)[1]	0.0209	allometric equation (Nagy 2001)[3]	95.0	0	0	Tomlinson et al. 1994	5.0	Assumed based upon diet
Red-tailed hawk	0.957	USEPA 1993	0.0680	allometric equation (USEPA 1993)[1]	0.0395	Sample and Suter 1994	0	0	100	USEPA 1993; Sample and Suter 1994	0	Sample and Suter 1994
Mammals												
Meadow vole	0.0300	Silva and Downing 1995	0.0133	USEPA 1993	0.0031	USEPA 1993	95.6	2.0	0	USEPA 1993	2.4	Beyer et al. 1994
Red fox	3.17	Silva and Downing 1995	0.4115	allometric equation (USEPA 1993)[2]	0.1476	Sample and Suter 1994	7.0	2.8	87.4	USEPA 1993	2.8	Beyer et al. 1994
Short-tailed shrew	0.0133	USEPA 1993	0.0048	USEPA 1993	0.0019	USEPA 1993	4.7	82.3	0	USEPA 1993; Sample and Suter 1994	13.0	Sample and Suter 1994

1 - All birds equation: $0.059\ (BW)^{0.67}$ (maximum body weight used: robin - 0.103 kg; dove - 0.163 kg; hawk - 1.235 kg)

2 - All mammals equation: $0.099\ (BW)^{0.90}$ (maximum body weight used: 4.87 kg)

3 - All birds equation: $(0.638*((BW*1000)^{0.685}))/1000$ (maximum body weight used: 0.163 kg)

TABLE 7-9

Exposure Parameters for Upper Trophic Level Ecological Receptors - Baseline

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Receptor	Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Dietary Composition (percent)				Soil Ingestion (percent)	
	Value	Reference	Value	Reference	Value	Reference	Terrestrial Plants	Soil Invertebrates	Small Mammals	Reference	Value	Reference
Birds												
American robin (omnivore)	0.077	USEPA 1993	0.0106	allometric equation (USEPA 1993)[1]	0.0055	Levey and Karasov 1989	51.9	43.5	0	Martin et al. 1951	4.6	Sample and Suter 1994
American robin (invertivore)	0.077	USEPA 1993	0.0106	allometric equation (USEPA 1993)[1]	0.0055	Levey and Karasov 1989	0	95.4	0	exclusive diet	4.6	Sample and Suter 1994
Mourning dove	0.127	Tomlinson et al. 1994	0.0148	allometric equation (USEPA 1993)[1]	0.0176	allometric equation (Nagy 2001)[3]	95.0	0.0	0	Tomlinson et al. 1994	5.0	Assumed based upon diet
Red-tailed hawk	1.134	USEPA 1993	0.0642	allometric equation (USEPA 1993)[1]	0.0363	Sample and Suter 1994	0	0	100	USEPA 1993; Sample and Suter 1994	0	Sample and Suter 1994
Mammals												
Meadow vole	0.043	Silva and Downing 1995	0.0090	USEPA 1993	0.0021	USEPA 1993	95.6	2.0	0	USEPA 1993	2.4	Beyer et al. 1994
Red fox	4.06	Silva and Downing 1995	0.3494	allometric equation (USEPA 1993)[2]	0.1231	Sample and Suter 1994	7.0	2.8	87.4	USEPA 1993	2.8	Beyer et al. 1994
Short-tailed shrew	0.017	USEPA 1993	0.0038	USEPA 1993	0.0015	USEPA 1993	4.7	82.3	0	USEPA 1993; Sample and Suter 1994	13.0	Sample and Suter 1994

1 - All birds equation: $0.059\ (BW)^{0.67}$

2 - All mammals equation: $0.099\ (BW)^{0.90}$

3 - All birds equation: $(0.638*((BW*1000)^{0.685}))/1000$

TABLE 7-10

Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type/Receptor	Reference	Comments
Inorganics					
Aluminum	pH < 5.5	--	Eco-SSL	USEPA 2003a	
Antimony	78.0	mg/kg	Eco-SSL - Invertebrate	USEPA 2005a	
Arsenic	18.0	mg/kg	Eco-SSL - Plant	USEPA 2005b	
Barium	330	mg/kg	Eco-SSL - Invertebrate	USEPA 2005c	
Beryllium	40.0	mg/kg	Eco-SSL - Invertebrate	USEPA 2005d	
Cadmium	32.0	mg/kg	Eco-SSL - Plant	USEPA 2005e	
Chromium	64.0	mg/kg	Soil Quality Guideline	CCME 2007	
Cobalt	13.0	mg/kg	Eco-SSL - Plant	USEPA 2005f	
Copper	70.0	mg/kg	Eco-SSL - Plant	USEPA 2007a	
Cyanide	15.8	mg/kg		MHSPE 2000	Geometric mean of target and intervention values (complex)
Iron	5 < pH > 8	--	Eco-SSL	USEPA 2003b	
Lead	120	mg/kg	Eco-SSL - Plant	USEPA 2005g	
Manganese	220	mg/kg	Eco-SSL - Plant	USEPA 2007b	
Mercury	0.10	mg/kg	Invertebrate	Efroymson et al. 1997b	
Nickel	38.0	mg/kg	Eco-SSL - Plant	USEPA 2007c	
Selenium	0.52	mg/kg	Eco-SSL - Plant	USEPA 2007d	
Silver	560	mg/kg	Eco-SSL - Plant	USEPA 2006a	
Thallium	1.00	mg/kg	Plant	Efroymson et al. 1997a	
Vanadium	130	mg/kg	Soil Quality Guideline	CCME 2007	
Zinc	120	mg/kg	Eco-SSL - Invertebrate	USEPA 2007e	
Pesticides					
4,4'-DDD	583	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
4,4'-DDE	114	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
4,4'-DDT	100	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Aldrin	3.63	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
alpha-BHC	226	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
alpha-Chlordane	11.0	ug/kg		MHSPE 2000	Geometric mean of target and intervention values

TABLE 7-10

Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type/Receptor	Reference	Comments
beta-BHC	342	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
delta-BHC	226	ug/kg		alpha-BHC value	
Dieldrin	10.5	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Endosulfan I	6.32	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Endosulfan II	6.32	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Endosulfan sulfate	6.32	ug/kg		Endosulfan value	
Endrin	1.95	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Endrin aldehyde	1.95	ug/kg		Endrin value	
Endrin ketone	1.95	ug/kg		Endrin value	
gamma-BHC (Lindane)	7.75	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
gamma-Chlordane	11.0	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Heptachlor	52.9	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Heptachlor epoxide	52.9	ug/kg		Heptachlor value	
Methoxychlor	500	ug/kg		Beyer 1990	B value
Toxaphene	500	ug/kg		Beyer 1990	B value
Polychlorinated Biphenyls					
Aroclor-1016	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
Aroclor-1221	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
Aroclor-1232	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
Aroclor-1242	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
Aroclor-1248	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
Aroclor-1254	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
Aroclor-1260	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
Semivolatile Organic Compounds					
1,1-Biphenyl	13,600	ug/kg	Plant	Efroymson et al. 1997a	EC50 (68,000); UF of 5
1,2,3-Trichlorobenzene	1,150	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 115,000; UF of 100
1,2,4,5-Tetrachlorobenzene	1,000	ug/kg		Beyer 1990	B value
1,2,4-Trichlorobenzene	1,270	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 127,000; UF of 100

TABLE 7-10

Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type/Receptor	Reference	Comments
1,2-Dichlorobenzene	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
1,3-Dichlorobenzene	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
1,4-Dichlorobenzene	1,280	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 128,000; UF of 100
2,3,4,6-Tetrachlorophenol	500	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
2,4,5-Trichlorophenol	1,350	ug/kg	Plant	Efroymson et al. 1997a	NOEC
2,4,6-Trichlorophenol	580	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 58,000; UF of 100
2,4-Dichlorophenol	500	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
2,4-Dimethylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
2,4-Dinitrophenol	20,000	ug/kg	Plant	Efroymson et al. 1997a	NOEC
2,4-Dinitrotoluene	11,000	ug/kg	Plant/Invertebrate	NRCC 2006	
2,6-Dinitrotoluene	8,500	ug/kg	Plant/Invertebrate	NRCC 2006	
2-Chloronaphthalene	see LMW PAHs				
2-Chlorophenol	500	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
2-Methylnaphthalene	see LMW PAHs				
2-Methylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value

TABLE 7-10

Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type/Receptor	Reference	Comments
2-Nitrophenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
3- and 4-Methylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
4,6-Dinitro-2-methylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
4-Chloro-3-methylphenol	500	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
4-Chloroaniline	500	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
4-Methylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
4-Nitrophenol	380	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 38,000; UF of 100
Acenaphthene	see LMW PAHs				
Acenaphthylene	see LMW PAHs				
Anthracene	see LMW PAHs				
Atrazine	11.9	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Benzo(a)anthracene	see HMW PAHs				
Benzo(a)pyrene	see HMW PAHs				
Benzo(b)fluoranthene	see HMW PAHs				
Benzo(g,h,i)perylene	see HMW PAHs				
Benzo(k)fluoranthene	see HMW PAHs				
bis(2-Ethylhexyl)phthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland

TABLE 7-10

Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type/Receptor	Reference	Comments
Butylbenzylphthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Chrysene	see HMW PAHs				
Dibenz(a,h)anthracene	see HMW PAHs				
Diethylphthalate	26,800	ug/kg	Plant	Efroymson et al. 1997a	EC50 (134,000); UF of 5
Dimethyl phthalate	10,640	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 1,064,000; UF of 100
Di-n-butylphthalate	40,000	ug/kg	Plant	Efroymson et al. 1997a	LOEC (200,000); UF of 5
Di-n-octylphthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Fluoranthene	see LMW PAHs				
Fluorene	see LMW PAHs				
Hexachlorobenzene	1,000	ug/kg		Beyer 1990	B value
Hexachlorocyclopentadiene	2,000	ug/kg	Plant	Efroymson et al. 1997a	LOEC (10,000); UF of 5
Indeno(1,2,3-cd)pyrene	see HMW PAHs				
Naphthalene	see LMW PAHs				
Nitrobenzene	2,260	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 226,000; UF of 100
n-Nitrosodiphenylamine	1,090	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 109,000; UF of 100
PAH (HMW)	18,000	ug/kg	Eco-SSL - Invertebrate	USEPA 2007i	
PAH (LMW)	29,000	ug/kg	Eco-SSL - Invertebrate	USEPA 2007i	
Pentachlorophenol	5,000	ug/kg	Eco-SSL - Plant	USEPA 2007h	
Phenanthrene	see LMW PAHs				
Phenol	1,880	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 188,000; UF of 100
Pyrene	see HMW PAHs				
Volatile Organic Compounds					
1,1,1-Trichloroethane	1,025	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
1,1,2,2-Tetrachloroethane	5,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
1,1,2-Trichloroethane	2,000	ug/kg		MHSPE 2000	Geometric mean of target and intervention values

TABLE 7-10

Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type/Receptor	Reference	Comments
1,1-Dichloroethane	548	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
1,1-Dichloroethene	173	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
1,2,3-Trichlorobenzene	1,150	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 115,000; UF of 100
1,2,4-Trichlorobenzene	1,270	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 127,000; UF of 100
1,2-Dibromoethane	300	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
1,2-Dichlorobenzene	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
1,2-Dichloroethane	2,190	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
1,2-Dichloroethene (total)	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
1,2-Dichloropropane	38,800	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 3,880,000; UF of 100
1,3-Dichlorobenzene	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
1,4-Dichlorobenzene	1,280	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 128,000; UF of 100
Benzene	1,140	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Bromoform	300	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Carbon tetrachloride	3,400	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Chlorobenzene	2,400	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 240,000; UF of 100
Chloroethane	5,000	ug/kg		CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Chloroform	1,844	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Chloromethane	5,000	ug/kg		CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
cis-1,2-Dichloroethene	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values

TABLE 7-10

Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type/Receptor	Reference	Comments
cis-1,3-Dichloropropene	5,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
Cyclohexane	6,000	ug/kg		Beyer 1990	B value
Ethylbenzene	1,815	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Methylene chloride	1,250	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
m- and p-Xylene	1,300	ug/kg		MHSPE 2000; 2001	Xylenes
o-Xylene	1,300	ug/kg		MHSPE 2000; 2001	Xylenes
Styrene	64,000	ug/kg	Plant	Efroymson et al. 1997a	EC50 (320,000); UF of 5
Tetrachloroethene	179	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Toluene	40,000	ug/kg	Plant	Efroymson et al. 1997a	EC50 (200,000); UF of 5
trans-1,2-Dichloroethene	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
trans-1,3-Dichloropropene	5,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value
Trichloroethene	500	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Vinyl chloride	412	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Xylene, total	1,300	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Explosives					
2,4,6-Trinitrotoluene	10,000	ug/kg	Plant	Talmage et al. 1999	
2,4-Dinitrotoluene	11,000	ug/kg	Plant/Invertebrate	NRCC 2006	
2,6-Dinitrotoluene	8,500	ug/kg	Plant/Invertebrate	NRCC 2006	
2-Amino-4,6-dinitrotoluene	80,000	ug/kg	Plant	Talmage et al. 1999	
4-Amino-2,6-dinitrotoluene	80,000	ug/kg	Plant	Talmage et al. 1999	2-Amino-4,6-dinitrotoluene value
HMX	10,000	ug/kg	Invertebrate	Talmage et al. 1999	
Nitrobenzene	2,260	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 226,000; UF of 100
Perchlorate	1,000	ug/kg	Invertebrate	USEPA 2002	
RDX	10,000	ug/kg	Invertebrate	Talmage et al. 1999	
Tetryl	10,000	ug/kg	Plant	Talmage et al. 1999	

TABLE 7-11

Ecological Screening Values (ESVs) for Water

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type	Reference	Comments[1]
Inorganics (Total)					
Aluminum	87.0	ug/L	Fresh	USEPA 2009	AWQC
Antimony	500	ug/L	Marine	USEPA 2006b	
Arsenic	36.0	ug/L	Marine	USEPA 2009	AWQC
Barium	200	ug/L	Marine	Buchman 2008	
Beryllium	100	ug/L	Marine	Buchman 2008	
Cadmium	8.85	ug/L	Marine	USEPA 2009	AWQC
Chromium	50.4	ug/L	Marine	USEPA 2009	AWQC
Cobalt	23.0	ug/L	Fresh	Suter and Tsao 1996	SCV
Copper	3.73	ug/L	Marine	USEPA 2009	AWQC
Cyanide	1.00	ug/L	Marine	USEPA 2009	AWQC
Iron	1,000	ug/L	Fresh	USEPA 2009	AWQC
Lead	8.52	ug/L	Marine	USEPA 2009	AWQC
Manganese	100	ug/L	Marine	Buchman 2008	
Mercury	1.11	ug/L	Marine	USEPA 2009	AWQC
Nickel	8.28	ug/L	Marine	USEPA 2009	AWQC
Selenium	71.1	ug/L	Marine	USEPA 2009	AWQC
Silver	0.23	ug/L	Marine	USEPA 2001	
Thallium	21.3	ug/L	Marine	USEPA 2001	
Vanadium	50.0	ug/L	Marine	Buchman 2008	
Zinc	85.6	ug/L	Marine	USEPA 2009	AWQC
Dissolved Metals					
Aluminum	87.0	ug/L	Fresh	USEPA 2009	AWQC
Antimony	500	ug/L	Marine	USEPA 2006b	
Arsenic	36.0	ug/L	Marine	USEPA 2009	AWQC
Barium	200	ug/L	Marine	Buchman 2008	
Beryllium	100	ug/L	Marine	Buchman 2008	
Cadmium	8.80	ug/L	Marine	USEPA 2009	AWQC

TABLE 7-11

Ecological Screening Values (ESVs) for Water

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type	Reference	Comments[1]
Chromium	50.0	ug/L	Marine	USEPA 2009	AWQC
Cobalt	23.0	ug/L	Fresh	Suter and Tsao 1996	SCV
Copper	3.10	ug/L	Marine	USEPA 2009	AWQC
Iron	1,000	ug/L	Fresh	USEPA 2009	AWQC
Lead	8.10	ug/L	Marine	USEPA 2009	AWQC
Manganese	100	ug/L	Marine	Buchman 2008	
Mercury	0.94	ug/L	Marine	USEPA 2009	AWQC
Nickel	8.20	ug/L	Marine	USEPA 2009	AWQC
Selenium	71.0	ug/L	Marine	USEPA 2009	AWQC
Silver	0.23	ug/L	Marine	USEPA 2001	
Thallium	21.3	ug/L	Marine	USEPA 2001	
Vanadium	50.0	ug/L	Marine	Buchman 2008	
Zinc	81.0	ug/L	Marine	USEPA 2009	AWQC
Pesticides					
4,4'-DDD	0.025	ug/L	Marine	USEPA 2001	
4,4'-DDE	0.14	ug/L	Marine	USEPA 2001	
4,4'-DDT	0.0065	ug/L	Marine	USEPA 2006b	
Aldrin	0.13	ug/L	Marine	USEPA 2001	
alpha-BHC	25.0	ug/L	Marine	USEPA 2006b	
alpha-Chlordane	0.004	ug/L	Marine	USEPA 2009	FRV - AWQC
beta-BHC	25.0	ug/L	Marine	alpha-BHC	
delta-BHC	25.0	ug/L	Marine	alpha-BHC	
Dieldrin	0.11	ug/L	Marine	USEPA 1996a	FCV
Endosulfan I	0.0087	ug/L	Marine	USEPA 2009	AWQC
Endosulfan II	0.0087	ug/L	Marine	USEPA 2009	AWQC
Endosulfan sulfate	0.0087	ug/L	Marine	USEPA 2009	AWQC
Endrin	0.01	ug/L	Marine	USEPA 1996a	FCV
Endrin aldehyde	0.01	ug/L	Marine	Endrin	

TABLE 7-11

Ecological Screening Values (ESVs) for Water

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type	Reference	Comments[1]
Endrin ketone	0.01	ug/L	Marine	Endrin	
gamma-BHC (Lindane)	0.016	ug/L	Marine	USEPA 2001	
gamma-Chlordane	0.004	ug/L	Marine	USEPA 2009	FRV - AWQC
Heptachlor	0.0036	ug/L	Marine	USEPA 2009	FRV - AWQC
Heptachlor epoxide	0.0036	ug/L	Marine	USEPA 2009	FRV - AWQC
Methoxychlor	0.03	ug/L	Marine	USEPA 2009	AWQC
Toxaphene	0.21	ug/L	Marine	USEPA 1996a	FCV
Polychlorinated Biphenyls					
Aroclor-1016	0.03	ug/L	Marine	USEPA 2009	FRV - AWQC
Aroclor-1221	0.03	ug/L	Marine	USEPA 2009	FRV - AWQC
Aroclor-1232	0.03	ug/L	Marine	USEPA 2009	FRV - AWQC
Aroclor-1242	0.03	ug/L	Marine	USEPA 2009	FRV - AWQC
Aroclor-1248	0.03	ug/L	Marine	USEPA 2009	FRV - AWQC
Aroclor-1254	0.03	ug/L	Marine	USEPA 2009	FRV - AWQC
Aroclor-1260	0.03	ug/L	Marine	USEPA 2009	FRV - AWQC
Semivolatile Organic Compounds					
1,1-Biphenyl	14.0	ug/L		USEPA 1996a	SCV
1,2,3-Trichlorobenzene	8.00	ug/L		USEPA 2006b	
1,2,4-Trichlorobenzene	5.40	ug/L		USEPA 2006b	
1,2-Dichlorobenzene	42.0	ug/L		USEPA 2006b	
1,3-Dichlorobenzene	28.5	ug/L		USEPA 2001	
1,4-Dichlorobenzene	19.9	ug/L		USEPA 2001	
2,4,5-Trichlorophenol	12.0	ug/L		USEPA 2006b	
2,4,6-Trichlorophenol	61.0	ug/L		USEPA 2006b	
2,4-Dichlorophenol	11.0	ug/L		USEPA 2006b	SCV
2,4-Dimethylphenol	100	ug/L		Buchman 2008	
2,4-Dinitrophenol	48.5	ug/L		USEPA 2001	
2,4-Dinitrotoluene	480	ug/L		Nipper et al. 2001	NOEC; algae

TABLE 7-11

Ecological Screening Values (ESVs) for Water

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type	Reference	Comments[1]
2,6-Dinitrotoluene	1,000	ug/L		Nipper et al. 2001	NOEC; algae
2-Chloronaphthalene	0.40	ug/L		Buchman 2008	
2-Chlorophenol	265	ug/L		USEPA 2006b	
2-Methylnaphthalene	330	ug/L		Buchman 2008	
2-Methylphenol	1,020	ug/L		USEPA 2006b	
2-Nitrophenol	2,940	ug/L		USEPA 2006b	
3,3'-Dichlorobenzidine	73.0	ug/L		USEPA 2006b	
4,6-Dinitro-2-methylphenol	2.30	ug/L		USEPA 2001	
4-Bromophenyl-phenylether	1.50	ug/L		USEPA 1996a	SCV
4-Chloro-3-methylphenol	0.30	ug/L		USEPA 2001	
4-Chloroaniline	232	ug/L		USEPA 2006b	
4-Methylphenol	543	ug/L		USEPA 2006b	
4-Nitrophenol	71.7	ug/L		USEPA 2001	
Acenaphthene	40.0	ug/L		USEPA 1996a	FCV
Acenaphthylene	4,840	ug/L		Buchman 2008	
Anthracene	0.18	ug/L		USEPA 2006b	
Atrazine	10.0	ug/L		Buchman 2008	
Benzo(a)anthracene	0.027	ug/L		Suter and Tsao 1996	SCV
Benzo(a)pyrene	0.014	ug/L		Suter and Tsao 1996	SCV
Benzo(b)fluoranthene	9.07	ug/L		Buchman 2008	
Benzo(g,h,i)perylene	7.64	ug/L		Buchman 2008	
Benzo(k)fluoranthene	9.07	ug/L		Benzo(b)fluoranthene value	
Benzoic acid	42.0	ug/L		Suter and Tsao 1996	SCV
Benzyl alcohol	8.60	ug/L		Suter and Tsao 1996	SCV
bis(2-Chloroethyl)ether	1,900	ug/L		Buchman 2008	
bis(2-Ethylhexyl)phthalate	360	ug/L		Buchman 2008	
Butylbenzylphthalate	29.4	ug/L		USEPA 2001	
Dibenzofuran	65.0	ug/L		USEPA 2006b	

TABLE 7-11

Ecological Screening Values (ESVs) for Water

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type	Reference	Comments[1]
Diethylphthalate	75.9	ug/L		USEPA 2001	
Dimethyl phthalate	580	ug/L		USEPA 2001	
Di-n-butylphthalate	3.40	ug/L		USEPA 2001	
Di-n-octylphthalate	22.0	ug/L		USEPA 2006b	
Fluoranthene	11.0	ug/L		USEPA 1996a	FCV
Fluorene	3.90	ug/L		USEPA 1996a	SCV
Hexachlorobenzene	3.68	ug/L		Buchman 2008	
Hexachlorobutadiene	0.32	ug/L		USEPA 2001	
Hexachlorocyclopentadiene	0.07	ug/L		USEPA 2001	
Hexachloroethane	9.40	ug/L		USEPA 2001	
Indeno(1,2,3-cd)pyrene	4.31	ug/L		Buchman 2008	
Isophorone	129	ug/L		USEPA 2001	
Naphthalene	23.5	ug/L		USEPA 2001	
Nitrobenzene	66.8	ug/L		USEPA 2001	
n-Nitroso-di-n-propylamine	120	ug/L		USEPA 2006b	
n-Nitrosodiphenylamine	33,000	ug/L		USEPA 2001	
Pentachlorophenol	7.90	ug/L		USEPA 2009	AWQC
Phenanthrene	8.30	ug/L		USEPA 1996a	FCV
Phenol	58.0	ug/L		USEPA 2001	
Pyrene	0.24	ug/L		USEPA 2006b	
Volatile Organic Compounds					
1,1,1-Trichloroethane	312	ug/L		USEPA 2001	
1,1,2,2-Tetrachloroethane	90.2	ug/L		USEPA 2001	
1,1,2-Trichloroethane	550	ug/L		USEPA 2006b	
1,1-Dichloroethane	47.0	ug/L		Suter and Tsao 1996	SCV
1,1-Dichloroethene	2,240	ug/L		USEPA 2001	
1,2,3-Trichlorobenzene	8.00	ug/L		USEPA 2006b	
1,2,4-Trichlorobenzene	5.40	ug/L		USEPA 2006b	

TABLE 7-11

Ecological Screening Values (ESVs) for Water

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type	Reference	Comments[1]
1,2-Dichlorobenzene	42.0	ug/L		USEPA 2006b	
1,2-Dichloroethane	1,130	ug/L		USEPA 2001	
1,2-Dichloropropane	2,400	ug/L		USEPA 2001	
1,2-Dichloroethene (total)	680	ug/L		USEPA 2006b	
1,3-Dichlorobenzene	28.5	ug/L		USEPA 2001	
1,4-Dichlorobenzene	19.9	ug/L		USEPA 2001	
2-Butanone	14,000	ug/L		Suter and Tsao 1996	SCV
2-Hexanone	99.0	ug/L		Suter and Tsao 1996	SCV
4-Methyl-2-pentanone	123,000	ug/L		USEPA 2006b	
Acetone	564,000	ug/L		USEPA 2006b	
Benzene	110	ug/L		USEPA 2006b	
Bromoform	640	ug/L		USEPA 2001	
Bromomethane	120	ug/L		USEPA 2001	
Carbon disulfide	0.92	ug/L		Suter and Tsao 1996	SCV
Carbon tetrachloride	1,500	ug/L		USEPA 2001	
Chlorobenzene	25.0	ug/L		USEPA 2006b	
Chloroform	815	ug/L		USEPA 2001	
Chloromethane	2,700	ug/L		USEPA 2001	
cis-1,2-Dichloroethene	680	ug/L		USEPA 2006b	
cis-1,3-Dichloropropene	7.90	ug/L		USEPA 2001	
Cumene (isopropylbenzene)	2.60	ug/L		USEPA 2006b	
Ethylbenzene	25.0	ug/L		USEPA 2006b	
Methylene chloride	2,560	ug/L		USEPA 2001	
Methyl-tert-butyl ether (MTBE)	5,000	ug/L		Buchman 2008	
m- and p-Xylene	19.0	ug/L		USEPA 2006b	
o-Xylene	19.0	ug/L		USEPA 2006b	
Styrene	910	ug/L		USEPA 2006b	
Tetrachloroethene	45.0	ug/L		USEPA 2001	

TABLE 7-11

Ecological Screening Values (ESVs) for Water

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	ESV	Units	Type	Reference	Comments[1]
Toluene	215	ug/L		USEPA 2006b	
trans-1,2-Dichloroethene	680	ug/L		USEPA 2006b	
trans-1,3-Dichloropropene	7.90	ug/L		USEPA 2001	
Trichloroethene	1,940	ug/L		USEPA 2006b	
Vinyl chloride	930	ug/L		USEPA 2006b	FCV
Xylene, total	19.0	ug/L		USEPA 2006b	
Explosives					
1,3,5-Trinitrobenzene	15.0	ug/L		Nipper et al. 2001	NOEC; algae
1,3-Dinitrobenzene	180	ug/L		Nipper et al. 2001	NOEC; algae
2,4,6-Trinitrotoluene	100	ug/L		USEPA 2006b	
2,4-Dinitrotoluene	480	ug/L		Nipper et al. 2001	NOEC; algae
2,6-Dinitrotoluene	1,000	ug/L		Nipper et al. 2001	NOEC; algae
2-Amino-4,6-dinitrotoluene	19.0	ug/L		Talmage et al. 1999	SCV
2-Nitrotoluene	3,400	ug/L		NAVFAC 2007	
3,5-Dinitroaniline	59.0	ug/L		Talmage et al. 1999	SCV
3-Nitrotoluene	750	ug/L		USEPA 2006b	
4-Amino-2,6-dinitrotoluene	19.0	ug/L		2-Amino-4,6-dinitrotoluene	
4-Nitrotoluene	1,900	ug/L		USEPA 2006b	
HMX	330	ug/L		Talmage et al. 1999	SCV
Nitrobenzene	66.8	ug/L		USEPA 2001	
Nitroglycerine	138	ug/L		USEPA 2006b	
Nitroguanidine	220	ug/L		NAVFAC 2007	NOEC
Perchlorate	9,300	ug/L		Dean et al. 2004	Chronic (CCC)
PETN	85,000	ug/L		USEPA 2006b	
RDX	5,000	ug/L		Nipper et al. 2001	NOEC; algae
Tetryl	8.00	ug/L		Nipper et al. 2001	NOEC; polychaete

[1] AWQC - Ambient Water Quality Criterion; FCV - Final Chronic Value; FRV - Final Residue Value; NOEC - No Observed Effect Concentration; SCV - Secondary Chronic Value

TABLE 7-12

Uncertainty Factors Used In Food Web Models

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Convert From	Convert To	Uncertainty Factor
Chronic NOAEL	Chronic NOAEL	1
Chronic LOAEL	Chronic NOAEL	5
Subchronic NOAEL	Chronic NOAEL	10
Subchronic LOAEL	Chronic NOAEL	20
Acute NOAEL	Chronic NOAEL	30
Acute LOAEL	Chronic NOAEL	50
LD50	Chronic NOAEL	100

Uncertainty factors from Wentsel et al. (1996)

Durations are defined as follows (USEPA 1999; Sample et al. 1996):

- Acute: <14 days
- Subchronic: 14 - 90 days
- Chronic: >90 days or during critical life stage

TABLE 7-13

Ingestion-Based Toxicity Reference Values (TRVs) for Mammals

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)
Metals											
Arsenic	Arsenite (As+3)	mouse	0.03	3 generations	oral in water/food	reproduction	1.26	Sample et al. 1996	0.25 a	--	0.56
Arsenic	--	dog	--	8 weeks	oral in diet	survival, growth, reproduction	1.66	USEPA 2005b	1.04	USEPA 2005b	1.31
Cadmium	--	rat	--	2 weeks	oral in water	survival, growth, reproduction	7.70	USEPA 2005e	0.77	USEPA 2005e	2.43
Chromium	Cr+3	multiple	--	--	oral	survival, growth, reproduction	12.0 b	--	2.40	USEPA 2008	5.37
Chromium	Cr+6	multiple	--	--	oral	survival, growth, reproduction	46.2 b	--	9.24	USEPA 2008	20.7
Copper	--	pig	--	4 weeks	oral in diet	survival, growth, reproduction	9.34	USEPA 2007a	5.60	USEPA 2007a	7.23
Copper	Copper sulfate	mink	1.00	357 days	oral in diet	reproduction	15.1	Sample et al. 1996	11.7	Sample et al. 1996	13.3
Lead	--	rat	--	7 weeks	oral in water	survival, growth, reproduction	8.90	USEPA 2005g	4.70	USEPA 2005g	6.47
Mercury	Methyl mercury chloride	rat	0.35	3 generations	oral in diet	reproduction	0.160	Sample et al. 1996	0.032	Sample et al. 1996	0.072
Mercury	Methyl mercury chloride	mink	1.00	93 days	oral in diet	survival/weight loss	0.25 c	Sample et al. 1996	0.15 c	Sample et al. 1996	0.19
Nickel	--	mouse	--	35 days	oral	survival, growth, reproduction	3.40	USEPA 2007c	1.70	USEPA 2007c	2.40
Selenium	Potassium selenate	rat	0.35	1 year	oral in water	reproduction	0.33	Sample et al. 1996	0.20	Sample et al. 1996	0.26
Silver	--	pig	--	40 days	oral in diet	survival, growth, reproduction	60.2	USEPA 2006a	12.0 a	--	26.9
Zinc	--	multiple	--	--	oral	survival, growth, reproduction	377 b	--	75.4	USEPA 2007e	169
Pesticides											
4,4'-DDD	--	rat	--	15 days	oral (gavage)	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329
4,4'-DDE	--	rat	--	15 days	oral (gavage)	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329
4,4'-DDT	--	rat	--	15 days	oral (gavage)	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329
Aldrin	--	rat	0.35	3 generations	oral in diet	reproduction	1.00	Sample et al. 1996	0.20	Sample et al. 1996	0.45
alpha-BHC	Mixed isomers	rat	0.35	4 generations	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26
alpha-Chlordane	Chlordane	mouse	0.03	6 generations	oral in diet	reproduction	9.16	Sample et al. 1996	4.58	Sample et al. 1996	6.48
beta-BHC	Mixed isomers	rat	0.35	4 generations	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26
delta-BHC	Mixed isomers	rat	0.35	4 generations	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26
Dieldrin	--	rat	--	750 days	oral in diet	survival, growth, reproduction	0.030	USEPA 2007g	0.015	USEPA 2007g	0.021
Endosulfan I	--	rat	0.35	30 days	oral (gavage)	fertility	0.75 b	--	0.15	Sample et al. 1996	0.34
Endosulfan II	--	rat	0.35	30 days	oral (gavage)	fertility	0.75 b	--	0.15	Sample et al. 1996	0.34
Endrin	--	mouse	0.03	120 days	oral in diet	reproduction	0.92	Sample et al. 1996	0.18 a	--	0.41
gamma-BHC (Lindane)	--	rat	0.35	3 generations	oral in diet	reproduction	40.0 b	--	8.00	Sample et al. 1996	17.9
gamma-Chlordane	Chlordane	mouse	0.03	6 generations	oral in diet	reproduction	9.16	Sample et al. 1996	4.58	Sample et al. 1996	6.48
Heptachlor	--	mink	1.00	181 days	oral in diet	reproduction	1.00	Sample et al. 1996	0.20 a	--	0.45
Heptachlor epoxide	--	mink	1.00	181 days	oral in diet	reproduction	1.00	Heptachlor value	0.20 a	--	0.45
Methoxychlor	--	rat	0.35	11 months	oral in diet	reproduction	8.00	Sample et al. 1996	4.00	Sample et al. 1996	5.66
Toxaphene	--	rat	0.35	3 generations	oral in diet	reproduction	40.0 b	--	8.00	Sample et al. 1996	17.9
Polychlorinated Biphenyls											
Aroclor-1016	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	Aroclor-1254 value	0.14 a	Aroclor-1254 value	0.30
Aroclor-1016	--	mink	1.00	18 months	oral in diet	reproduction	3.43	Sample et al. 1996	1.37	Sample et al. 1996	2.17
Aroclor-1221	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	Aroclor-1254 value	0.14 a	Aroclor-1254 value	0.30
Aroclor-1221	--	mink	1.00	7 months	oral in diet	reproduction	0.69	Aroclor-1242 value	0.14 a	Aroclor-1242 value	0.31
Aroclor-1232	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	Aroclor-1254 value	0.14 a	Aroclor-1254 value	0.30
Aroclor-1232	--	mink	1.00	7 months	oral in diet	reproduction	0.69	Aroclor-1242 value	0.14 a	Aroclor-1242 value	0.31
Aroclor-1242	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	Aroclor-1254 value	0.14 a	Aroclor-1254 value	0.30

TABLE 7-13

Ingestion-Based Toxicity Reference Values (TRVs) for Mammals

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)
Aroclor-1242	--	mink	1.00	7 months	oral in diet	reproduction	0.69	Sample et al. 1996	0.14 a	--	0.31
Aroclor-1248	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	Aroclor-1254 value	0.14 a	Aroclor-1254 value	0.30
Aroclor-1248	--	mink	1.00	4.5 months	oral in diet	reproduction	0.69	Aroclor-1254 value	0.14	Aroclor-1254 value	0.31
Aroclor-1254	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	Sample et al. 1996	0.14 a	--	0.30
Aroclor-1254	--	mink	1.00	4.5 months	oral in diet	reproduction	0.69	Sample et al. 1996	0.14	Sample et al. 1996	0.31
Aroclor-1260	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	Aroclor-1254 value	0.14 a	Aroclor-1254 value	0.30
Aroclor-1260	--	mink	1.00	4.5 months	oral in diet	reproduction	0.69	Aroclor-1254 value	0.14	Aroclor-1254 value	0.31
Volatile and Semivolatile Organic Compounds											
1,1,2,2-Tetrachloroethane	--	rat	0.35	78 weeks	oral (gavage)	reproduction	380 b	--	76.0	ATSDR 2008	170
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	NA	--	NA	--	NA
1,2,4-Trichlorobenzene	--	rat	0.35	3 generations	oral in water	reproduction	106	Coulston and Kolbye 1994	53.0	Coulston and Kolbye 1994	75.0
1,2-Dichlorobenzene	--	rat	0.35	chronic	oral	liver/kidney	429 b	--	85.7	Coulston and Kolbye 1994	192
1,3-Dichlorobenzene	--	rat	0.35	chronic	oral	liver/kidney	429 b	--	85.7	Value for 1,2-Dichlorobenzene	192
1,4-Dichlorobenzene	--	rat	0.35	2 generations	oral (gavage)	developmental	90.0	ATSDR 2006	30.0	ATSDR 2006	52.0
4-Bromophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA
4-Chlorophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA
Acenaphthene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	USEPA 2007i	65.6	USEPA 2007i	147
Acenaphthylene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	USEPA 2007i	65.6	USEPA 2007i	147
Anthracene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	USEPA 2007i	65.6	USEPA 2007i	147
Benzo(a)anthracene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37
Benzo(a)pyrene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37
Benzo(b)fluoranthene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37
Benzo(g,h,i)perylene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37
Benzo(k)fluoranthene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37
Chrysene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37
Dibenz(a,h)anthracene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37
Fluoranthene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	USEPA 2007i	65.6	USEPA 2007i	147
Fluorene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	USEPA 2007i	65.6	USEPA 2007i	147
Hexachlorobenzene	--	rat	0.35	4 generations	oral in diet	reproduction	4.00	ATSDR 2002	2.00	ATSDR 2002	2.83
Hexachlorobutadiene	--	rat	0.35	GD 1-22; LD 1-21	oral in diet	developmental	20.0	ATSDR 1994	2.00	ATSDR 1994	6.32
Hexachlorocyclopentadiene	--	mouse	0.03	GD 6-15	oral (gavage)	developmental	375 b	--	75.0	ATSDR 1999	168
Hexachloroethane	--	rat	0.35	GD 6-16	oral (gavage)	reproduction	500	ATSDR 1997	100	ATSDR 1997	224
Indeno(1,2,3-cd)pyrene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37
Pentachlorophenol	--	multiple	--	--	oral	survival, growth, reproduction	42.1 b	--	8.42	USEPA 2007h	18.8
Phenanthrene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	USEPA 2007i	65.6	USEPA 2007i	147
Pyrene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	USEPA 2007i	0.62	USEPA 2007i	1.37

NA - Not Available

[a] Uncertainty factor of 5 applied to LOAEL

[b] Uncertainty factor of 5 applied to NOAEL

[c] Does not include subchronic uncertainty factor of 10 applied by Sample et al (1996) since the study duration meets the criteria for a chronic study in Table 7-12

TABLE 7-14

Ingestion-Based Toxicity Reference Values (TRVs) for Birds

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)
Metals											
Arsenic	--	chicken	--	19 days	oral in diet	survival, growth,reproductior	11.2 b	--	2.24	USEPA 2005b	5.01
Arsenic	Sodium arsenite	mallard	1.00	128 days	oral in diet	survival	12.8	Sample et al. 1996	5.14	Sample et al. 1996	8.12
Cadmium	--	multiple	--	--	oral in diet	survival, growth,reproductior	7.35 b	--	1.47	USEPA 2005e	3.29
Chromium	Cr+3	multiple	--	--	oral in diet	survival, growth,reproductior	13.3 b	--	2.66	USEPA 2008	5.95
Copper	--	chicken	--	84 days	oral in diet	survival, growth,reproductior	12.1	USEPA 2007a	4.05	USEPA 2007a	7.00
Lead	--	chicken	--	4 weeks	oral in diet	survival, growth,reproductior	3.26	USEPA 2005g	1.63	USEPA 2005g	2.31
Lead	Metallic	American kestrel	0.13	7 months	oral in diet	reproduction	19.3 b	--	3.85	Sample et al. 1996	8.61
Mercury	Mercury chloride	Japanese quail	0.15	1 year	oral in diet	reproduction	0.90	Sample et al. 1996	0.45	Sample et al. 1996	0.64
Mercury	--	red-tailed hawk	1.10	12 weeks	oral in diet	survival/neurological	1.20	USEPA 1995b	0.49	USEPA 1995b	0.77
Mercury	Methyl mercury	mallard	1.00	3 generations	oral in diet	reproduction	0.078	USEPA 1997b	0.026	USEPA 1997b	0.045
Nickel	--	multiple	--	--	oral in diet	survival, growth,reproductior	33.6 b	--	6.71	USEPA 2007c	15.0
Selenium	Selanomethionine	mallard	1.00	100 days	oral in diet	reproduction	0.80	Sample et al. 1996	0.40	Sample et al. 1996	0.57
Selenium	Selanomethionine	black-crowned night-heron	0.88	94 days	oral in diet	reproduction	9.00 b	--	1.80	Sample et al. 1996	4.02
Selenium	Selanomethionine	screech owl	0.20	13.7 weeks	oral in diet	reproduction	1.50	Sample et al. 1996	0.44	Sample et al. 1996	0.81
Selenium	--	chicken	--	2 weeks	oral in diet	survival, growth,reproductior	0.58	USEPA 2007d	0.29	USEPA 2007d	0.41
Silver	--	turkey	--	5 weeks	oral in diet	survival, growth	20.2	USEPA 2006a	4.04 a	--	9.03
Zinc	--	multiple	--	--	oral in diet	survival, growth,reproductior	331 b	--	66.1	USEPA 2007e	148
Pesticides											
4,4'-DDD	--	Japanese quail	0.11	3 generations	oral in diet	reproduction	5.00	DDT value	0.50	DDT value	1.58
4,4'-DDD	--	barn owl	0.47	2 years	oral in diet	reproduction	0.40 b	DDE value	0.08	DDE value	0.18
4,4'-DDD	--	mallard	1.00	2 years	oral in diet	reproduction	0.60	DDE value	0.12	DDE value	0.27
4,4'-DDD	--	bald eagle	--	112 days	oral in diet	survival	3.00	DDT value	0.30	DDT value	0.95
4,4'-DDE	--	Japanese quail	0.11	3 generations	oral in diet	reproduction	5.00	DDT value	0.50	DDT value	1.58
4,4'-DDE	--	barn owl	0.47	2 years	oral in diet	reproduction	0.40 b	--	0.08	Blus 1996	0.18
4,4'-DDE	--	mallard	1.00	2 years	oral in diet	reproduction	0.60	USEPA 1995b	0.12	USEPA 1995b	0.27
4,4'-DDE	--	bald eagle	--	112 days	oral in diet	survival	3.00	DDT value	0.30	DDT value	0.95
4,4'-DDT	--	Japanese quail	0.11	3 generations	oral in diet	reproduction	5.00	USEPA 1995b	0.50	USEPA 1995b	1.58
4,4'-DDT	--	barn owl	0.47	2 years	oral in diet	reproduction	0.40 b	DDE value	0.08	DDE value	0.18
4,4'-DDT	--	mallard	1.00	2 years	oral in diet	reproduction	1.50	USEPA 1995b	0.60	USEPA 1995b	0.95
4,4'-DDT	--	bald eagle	--	112 days	oral in diet	survival	3.00	USEPA 1995b	0.30	USEPA 1995b	0.95
Aldrin	--	ring-necked pheasant	1.14	5 days	oral in diet	survival	0.351 b	--	0.070 e	Hill et al. 1975	0.157
Aldrin	--	mallard	1.00	5 days	oral in diet	survival	0.775 b	--	0.155 e	Hill et al. 1975	0.347
alpha-BHC	Mixed isomers	Japanese quail	0.15	90 days	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13
alpha-Chlordane	Chlordane	red-winged blackbird	0.06	84 days	oral in diet	survival	10.7	Sample et al. 1996	2.14	Sample et al. 1996	4.79
alpha-Chlordane	--	northern bobwhite	0.19	not specified	oral in diet	reproduction	5.95 b	--	1.19	Wiemeyer 1996	2.66
alpha-Chlordane	--	mallard	1.00	not specified	oral in diet	reproduction	4.00 b	--	0.80	Wiemeyer 1996	1.79
beta-BHC	Mixed isomers	Japanese quail	0.15	90 days	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13
delta-BHC	Mixed isomers	Japanese quail	0.15	90 days	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13
Dieldrin	--	mallard	--	24 days	oral in diet	survival, growth,reproductior	3.78	USEPA 2007g	0.071	USEPA 2007g	0.52
Endosulfan I	--	gray partridge	0.40	4 weeks	oral in diet	reproduction	50.0 b	--	10.0	Sample et al. 1996	22.4

TABLE 7-14

Ingestion-Based Toxicity Reference Values (TRVs) for Birds

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)		Reference	NOAEL (mg/kg/d)		Reference	MATC (mg/kg/d)
Endosulfan II	--	gray partridge	0.40	4 weeks	oral in diet	reproduction	50.0	b	--	10.0		Sample et al. 1996	22.4
Endrin	--	mallard	1.15	>200 days	oral in diet	reproduction	1.50	b	--	0.30		Sample et al. 1996	0.67
Endrin	--	screech owl	0.18	>83 days	oral in diet	reproduction	0.104		Sample et al. 1996	0.021	a	--	0.046
gamma-BHC (Lindane)	--	mallard	1.00	8 weeks	oral (intubation)	reproduction	20.0		Sample et al. 1996	4.00	a	--	8.94
gamma-Chlordane	Chlordane	red-winged blackbird	0.06	84 days	oral in diet	survival	10.7		Sample et al. 1996	2.14		Sample et al. 1996	4.79
gamma-Chlordane	--	northern bobwhite	0.19	not specified	oral in diet	reproduction	5.95	b	--	1.19		Wiemeyer 1996	2.66
gamma-Chlordane	--	mallard	1.00	not specified	oral in diet	reproduction	4.00	b	--	0.80		Wiemeyer 1996	1.79
Heptachlor	--	ring-necked pheasant	1.14	5 days	oral in diet	survival	1.38	b	--	0.28	e	Hill et al. 1975	0.62
Heptachlor	--	mallard	1.00	5 days	oral in diet	survival	2.40	b	--	0.48	e	Hill et al. 1975	1.07
Heptachlor epoxide	--	ring-necked pheasant	1.14	5 days	oral in diet	survival	1.38	b	--	0.28	e	Heptachlor value	0.62
Heptachlor epoxide	--	mallard	1.00	5 days	oral in diet	survival	2.40	b	--	0.48	e	Heptachlor value	1.07
Methoxychlor	--	chicken	1.50	16 weeks	oral in diet	reproduction	1,775	b	--	355		Wiemeyer 1996	794
Toxaphene	--	American black duck	1.00	2 seasons	oral in diet	reproduction	5.00		Wiemeyer 1996	1.00		Wiemeyer 1996	2.24
Polychlorinated Biphenyls													
Aroclor-1016	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80
Aroclor-1016	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92
Aroclor-1016	--	mallard	1.00	1 month	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35
Aroclor-1221	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80
Aroclor-1221	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92
Aroclor-1221	--	mallard	1.00	1 month	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35
Aroclor-1232	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80
Aroclor-1232	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92
Aroclor-1232	--	mallard	1.00	1 month	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35
Aroclor-1242	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80
Aroclor-1242	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05	b	--	0.41		Sample et al. 1996	0.92
Aroclor-1242	--	mallard	1.00	1 month	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35
Aroclor-1248	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80
Aroclor-1248	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92
Aroclor-1248	--	mallard	1.00	1 month	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35
Aroclor-1254	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80		Sample et al. 1996	0.36	a	--	0.80
Aroclor-1254	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92
Aroclor-1254	--	mallard	1.00	1 month	oral in diet	reproduction	7.50	b	--	1.50		USEPA 1995b	3.35
Aroclor-1260	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80		Aroclor-1254 value	0.36	a	Aroclor-1254 value	0.80
Aroclor-1260	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05	b	Aroclor-1242 value	0.41		Aroclor-1242 value	0.92
Aroclor-1260	--	mallard	1.00	1 month	oral in diet	reproduction	7.50	b	Aroclor-1254 value	1.50		Aroclor-1254 value	3.35
Volatile and Semivolatile Organic Compounds													
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	NA		--	NA		--	NA
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	NA		--	NA		--	NA
1,2,4-Trichlorobenzene	--	northern bobwhite	0.19	14 days	oral	survival	161	b	1,4-Dichlorobenzene value	32.2	d	1,4-Dichlorobenzene value	71.9
1,2-Dichlorobenzene	--	northern bobwhite	0.19	14 days	oral	survival	161	b	1,4-Dichlorobenzene value	32.2	d	1,4-Dichlorobenzene value	71.9
1,3-Dichlorobenzene	--	northern bobwhite	0.19	14 days	oral	survival	161	b	1,4-Dichlorobenzene value	32.2	d	1,4-Dichlorobenzene value	71.9

TABLE 7-14

Ingestion-Based Toxicity Reference Values (TRVs) for Birds

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)
1,4-Dichlorobenzene	--	northern bobwhite	0.19	14 days	oral	survival	161 b	--	32.2 d	TERRETOX 2002	71.9
4-Bromophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA
4-Chlorophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA
Acenaphthene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Acenaphthylene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Anthracene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Benzo(a)anthracene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Benzo(a)pyrene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Rigdon and Neal 1963	15.9
Benzo(b)fluoranthene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Benzo(g,h,i)perylene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Benzo(k)fluoranthene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Chrysene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Dibenz(a,h)anthracene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Fluoranthene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Fluorene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Hexachlorobenzene	--	Japanese quail	0.15	90 days	oral in diet	reproduction	0.57	Coulston and Kolbye 1994; TERRETOX 2002	0.11	Coulston and Kolbye 1994; TERRETOX 2002	0.25
Hexachlorobutadiene	--	Japanese quail	0.15	90 days	oral in diet	reproduction	17.0 b	--	3.39	Coulston and Kolbye 1994; TERRETOX 2002	7.58
Hexachlorocyclopentadiene	--	--	--	--	--	--	NA	--	NA	--	NA
Hexachloroethane	--	--	--	--	--	--	NA	--	NA	--	NA
Indeno(1,2,3-cd)pyrene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Pentachlorophenol	--	chicken	--	1 week	oral in diet	survival, growth	67.3	USEPA 2007h	6.73	USEPA 2007h	21.3
Phenanthrene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9
Pyrene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9

NA - Not Available

[a] Uncertainty factor of 5 applied to LOAEL

[b] Uncertainty factor of 5 applied to NOAEL

[c] Subchronic to chronic uncertainty factor of 10 applied

[d] Acute to chronic uncertainty factor of 50 applied

[e] Uncertainty factor of 100 applied to LD50

TABLE 7-15

Screening Statistics - Site 24 Surface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																				
Aluminum	-- - --	50 / 50	1,760	11,900	YS24-SS28-0410	6,122	2,019	6,601	5,773	pH < 5.5	14 / 38	--	**YES**	mean pH in range		NO	12,200	0 / 50	0.98	NO
Antimony	0.79 - 2.80	15 / 48	0.36	1.10	YS24-SS04-0410	0.74	0.38	0.83	0.66	78.0	0 / 48	0.01	NO	--	--	NO	--	-- / --	--	NO
Arsenic	0.32 - 1.60	35 / 50	0.64	151	YS24-SS31-0410	6.15	23.1	11.6	1.46	18.0	2 / 50	8.39	**YES**	0.65	0.34	NO	--	-- / --	--	NO
Barium	-- - --	50 / 50	13.6	113	YS24-SS12-0410	33.2	14.6	36.7	31.0	330	0 / 50	0.34	NO	--	--	NO	--	-- / --	--	NO
Beryllium	#### - 0.24	42 / 50	0.070	2.40	YS24-SS12-0410	0.31	0.33	0.39	0.23	40.0	0 / 50	0.06	NO	--	--	NO	--	-- / --	--	NO
Cadmium	#### - 0.56	34 / 50	0.050	4.30	A06SS17-00	0.45	0.65	0.61	0.27	32.0	0 / 50	0.13	NO	--	--	NO	--	-- / --	--	NO
Calcium [3]	-- - --	50 / 50	102	140,000	YS24-SS08-0410	5,504	22,214	10,771	675	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Chromium	-- - --	50 / 50	2.50	24.6	24SS04	8.64	4.87	9.80	7.54	64.0	0 / 50	0.38	NO	--	--	NO	--	-- / --	--	NO
Cobalt	-- - --	50 / 50	0.38	9.00	YS24-SS31-0410	2.29	1.84	2.73	1.78	13.0	0 / 50	0.69	NO	--	--	NO	--	-- / --	--	NO
Copper	1.30 - 3.30	46 / 50	1.20	139	A06SS11-00	8.37	20.6	13.3	3.83	70.0	1 / 50	1.99	**YES**	0.19	0.12	NO	--	-- / --	--	NO
Cyanide	0.52 - 2.90	4 / 50	0.14	2.70	A06SS13-00	0.66	0.59	0.80	0.47	15.8	0 / 50	0.17	NO	--	--	NO	--	-- / --	--	NO
Iron	-- - --	50 / 50	1,510	17,700	YS24-SS06-0410	5,517	3,635	6,379	4,647	5 < pH > 8	5 / 38	--	**YES**	mean pH in range		NO	19,900	0 / 50	0.89	NO
Lead	-- - --	50 / 50	3.30	46.9	YS24-SS17-0410	12.2	8.80	14.3	10.2	120	0 / 50	0.39	NO	--	--	NO	--	-- / --	--	NO
Magnesium [3]	-- - --	50 / 50	133	2,010	YS24-SS12-0410	522	406	619	428	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Manganese	-- - --	50 / 50	12.5	963	YS24-SS12-0410	92.4	134	124	63.7	220	2 / 50	4.38	**YES**	0.56	0.42	NO	--	-- / --	--	NO
Mercury	#### - 0.12	28 / 50	0.018	4.70	A06SS11-00	0.15	0.66	0.30	0.043	0.10	4 / 50	47.0	**YES**	3.05	1.48	**YES**	0.111	3 / 50	42.3	**YES**
Nickel	-- - --	50 / 50	1.20	10.5	YS24-SS12-0410	3.66	1.92	4.11	3.21	38.0	0 / 50	0.28	NO	--	--	NO	--	-- / --	--	NO
Potassium [3]	189 - 294	44 / 50	151	1,740	YS24-SS06-0410	479	386	571	370	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Selenium	0.52 - 0.92	4 / 50	0.58	0.78	A06SS12-00	0.33	0.11	0.36	0.32	0.52	4 / 50	1.50	**YES**	0.68	0.63	NO	--	-- / --	--	NO
Silver	0.21 - 0.67	3 / 50	0.35	8.10	A06SS11-00	0.47	1.18	0.75	0.27	560	0 / 50	0.01	NO	--	--	NO	--	-- / --	--	NO
Sodium [3]	45.9 - 49.9	45 / 50	22.9	1,260	YS24-SS08-0410	115	176	157	76.2	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Thallium	0.84 - 1.30	0 / 50	--	--	--	0.54	0.067	0.55	0.53	1.00	-- / --	1.30	**YES**	0.55	0.54	NO	--	-- / --	--	NO
Vanadium	-- - --	50 / 50	3.70	34.3	YS24-SS02-0410	12.9	6.49	14.4	11.4	130	0 / 50	0.26	NO	--	--	NO	--	-- / --	--	NO
Zinc	-- - --	50 / 50	4.90	68.3	A06SS15-00	22.3	12.7	25.3	19.1	120	0 / 50	0.57	NO	--	--	NO	--	-- / --	--	NO
Pesticides (UG/KG)																				
4,4'-DDD	3.40 - 4.50	6 / 50	0.47	35.0	A06SS11-00	2.42	4.72	3.54	1.79	583	0 / 50	0.06	NO	--	--	NO	--	-- / --	--	NO
4,4'-DDE	3.40 - 4.30	17 / 50	0.26	11.0	A06SS11-00	1.74	1.44	2.08	1.45	114	0 / 50	0.10	NO	--	--	NO	--	-- / --	--	NO
4,4'-DDT	0.58 - 4.30	15 / 50	0.58	29.0	A06SS11-00	2.23	3.96	3.17	1.52	100	0 / 50	0.29	NO	--	--	NO	--	-- / --	--	NO
Aldrin	1.70 - 9.90	4 / 50	0.26	0.47	YS24-SS07-0410	0.99	0.60	1.13	0.91	3.63	0 / 50	0.13	NO	--	--	NO	--	-- / --	--	NO
alpha-BHC	1.70 - 9.90	4 / 50	0.29	0.71	YS24-SS16-0410	1.00	0.59	1.14	0.93	226	0 / 50	0.003	NO	--	--	NO	--	-- / --	--	NO
alpha-Chlordane	1.70 - 2.20	17 / 50	0.18	74.0	A06SS11-00	2.37	10.3	4.83	0.87	11.0	1 / 50	6.73	**YES**	0.44	0.22	NO	--	-- / --	--	NO
beta-BHC	0.94 - 9.90	7 / 50	0.77	2.90	YS24-SS15-0410	1.03	0.66	1.19	0.94	342	0 / 50	0.01	NO	--	--	NO	--	-- / --	--	NO
delta-BHC	1.70 - 9.90	10 / 50	0.19	0.97	YS24-SS25-0410	0.92	0.63	1.07	0.81	226	0 / 50	0.004	NO	--	--	NO	--	-- / --	--	NO
Dieldrin	3.40 - 4.50	5 / 50	0.23	6.60	A06SS11-00	1.85	0.80	2.04	1.68	10.5	0 / 50	0.63	NO	--	--	NO	--	-- / --	--	NO
Endosulfan I	1.70 - 9.90	7 / 50	0.20	0.61	YS24-SS25-0410	0.96	0.62	1.10	0.85	6.32	0 / 50	0.10	NO	--	--	NO	--	-- / --	--	NO
Endosulfan II	3.40 - 19.0	2 / 50	0.42	0.52	YS24-SS02-0410	1.97	1.13	2.23	1.82	6.32	0 / 50	0.08	NO	--	--	NO	--	-- / --	--	NO
Endosulfan sulfate	3.40 - 19.0	4 / 50	0.38	1.50	YS24-SS02-0410	1.92	1.15	2.20	1.76	6.32	0 / 50	0.24	NO	--	--	NO	--	-- / --	--	NO
Endrin	3.40 - 19.0	5 / 50	0.41	0.59	YS24-SS09-0410	1.88	1.18	2.16	1.68	1.95	0 / 50	0.30	NO	--	--	NO	--	-- / --	--	NO
Endrin aldehyde	3.40 - 19.0	11 / 50	0.41	1.20	YS24-SS31-0410	1.73	1.24	2.03	1.48	1.95	0 / 50	0.62	NO	--	--	NO	--	-- / --	--	NO
Endrin ketone	3.40 - 19.0	6 / 50	0.44	1.70	YS24-SS09-0410	1.92	1.14	2.19	1.77	1.95	0 / 50	0.87	NO	--	--	NO	--	-- / --	--	NO
gamma-BHC (Lindane)	1.70 - 9.90	8 / 50	0.28	1.10	YS24-SS18-0410	0.99	0.60	1.13	0.91	7.75	0 / 50	0.14	NO	--	--	NO	--	-- / --	--	NO
gamma-Chlordane	1.70 - 2.20	17 / 50	0.24	76.0	A06SS11-00	2.36	10.6	4.88	0.86	11.0	1 / 50	6.91	**YES**	0.44	0.21	NO	--	-- / --	--	NO
Heptachlor	1.70 - 9.90	8 / 50	0.20	0.94	YS24-SS11-0410	0.94	0.63	1.09	0.82	52.9	0 / 50	0.02	NO	--	--	NO	--	-- / --	--	NO

TABLE 7-15

Screening Statistics - Site 24 Surface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
Heptachlor epoxide	1.70 - 9.90	4 / 50	0.18	0.49	YS24-SS02-0410	0.99	0.60	1.13	0.90	52.9	0 / 50	0.01	NO	--	--	NO	--	-- / --	--	NO
Methoxychlor	1.20 - 99.0	1 / 50	4.80	4.80	YS24-SS02-0410	9.80	6.15	11.3	8.44	500	0 / 50	0.01	NO	--	--	NO	--	-- / --	--	NO
Toxaphene	89.0 - 990	0 / 50	--	--	--	73.0	65.0	88.4	63.4	500	-- / --	1.98	**YES**	0.18	0.15	NO	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																				
Aroclor-1016	26.0 - 190	0 / 50	--	--	--	17.0	11.5	19.7	15.8	8,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1221	37.0 - 390	0 / 50	--	--	--	29.3	25.4	35.4	25.7	8,000	-- / --	0.05	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1232	18.0 - 190	0 / 50	--	--	--	14.5	12.3	17.4	12.8	8,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1242	18.0 - 190	0 / 50	--	--	--	14.5	12.3	17.4	12.8	8,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1248	18.0 - 190	0 / 50	--	--	--	14.5	12.3	17.4	12.8	8,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1254	18.0 - 190	0 / 50	--	--	--	14.5	12.3	17.4	12.8	8,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1260	18.0 - 190	0 / 50	--	--	--	14.5	12.3	17.4	12.8	8,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																				
1,1-Biphenyl	180 - 230	0 / 31	--	--	--	97.1	4.96	98.6	97.0	13,600	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
2,2'-Oxybis(1-chloropropane)	180 - 390	0 / 43	--	--	--	121	39.2	131	116	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
2,4,5-Trichlorophenol	350 - 940	0 / 50	--	--	--	286	127	316	261	1,350	-- / --	0.70	NO	--	--	NO	--	-- / --	--	NO
2,4,6-Trichlorophenol	340 - 440	0 / 50	--	--	--	186	8.87	189	186	580	-- / --	0.76	NO	--	--	NO	--	-- / --	--	NO
2,4-Dichlorophenol	340 - 440	0 / 50	--	--	--	186	8.87	189	186	500	-- / --	0.88	NO	--	--	NO	--	-- / --	--	NO
2,4-Dimethylphenol	340 - 440	0 / 50	--	--	--	186	8.87	189	186	1,000	-- / --	0.44	NO	--	--	NO	--	-- / --	--	NO
2,4-Dinitrophenol	350 - 940	0 / 50	--	--	--	286	127	316	261	20,000	-- / --	0.05	NO	--	--	NO	--	-- / --	--	NO
2,4-Dinitrotoluene	250 - ####	1 / 50	1,500	1,500	YS24-SS17-0410	534	328	612	402	11,000	0 / 50	0.14	NO	--	--	NO	--	-- / --	--	NO
2,6-Dinitrotoluene	250 - ####	0 / 50	--	--	--	983	667	1,141	605	8,500	-- / --	0.35	NO	--	--	NO	--	-- / --	--	NO
2-Chloronaphthalene	180 - 390	1 / 50	66.0	66.0	YS24-SS11-0410	129	43.4	139	122	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
2-Chlorophenol	340 - 440	0 / 50	--	--	--	186	8.87	189	186	500	-- / --	0.88	NO	--	--	NO	--	-- / --	--	NO
2-Methylnaphthalene	180 - 390	2 / 50	49.0	56.0	YS24-SS10-0410	128	44.7	139	120	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
2-Methylphenol	340 - 440	0 / 50	--	--	--	186	8.87	189	186	1,000	-- / --	0.44	NO	--	--	NO	--	-- / --	--	NO
2-Nitroaniline	180 - 940	0 / 50	--	--	--	230	171	270	173	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
2-Nitrophenol	340 - 440	0 / 50	--	--	--	186	8.87	189	186	1,000	-- / --	0.44	NO	--	--	NO	--	-- / --	--	NO
3,3'-Dichlorobenzidine	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
3-Nitroaniline	190 - 940	0 / 50	--	--	--	284	129	315	258	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4,6-Dinitro-2-methylphenol	350 - 940	0 / 50	--	--	--	286	127	316	261	1,000	-- / --	0.94	NO	--	--	NO	--	-- / --	--	NO
4-Bromophenyl-phenylether	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Chloro-3-methylphenol	340 - 440	0 / 50	--	--	--	186	8.87	189	186	500	-- / --	0.88	NO	--	--	NO	--	-- / --	--	NO
4-Chloroaniline	190 - 440	1 / 50	180	180	A06SS11-00	184	15.7	188	184	500	0 / 50	0.36	NO	--	--	NO	--	-- / --	--	NO
4-Chlorophenyl-phenylether	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Methylphenol	270 - 390	0 / 50	--	--	--	158	21.1	163	156	1,000	-- / --	0.39	NO	--	--	NO	--	-- / --	--	NO
4-Nitroaniline	190 - 940	0 / 50	--	--	--	284	129	315	258	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Nitrophenol	350 - 940	0 / 50	--	--	--	286	127	316	261	380	-- / --	2.47	**YES**	0.83	0.75	NO	--	-- / --	--	NO
Acenaphthene	180 - 390	0 / 50	--	--	--	130	42.5	140	123	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Acenaphthylene	180 - 390	1 / 50	26.0	26.0	YS24-SS31-0410	128	44.7	139	120	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Acetophenone	94.0 - 230	0 / 31	--	--	--	95.5	10.3	98.7	94.8	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Anthracene	180 - 390	1 / 50	35.0	35.0	YS24-SS31-0410	129	44.3	139	121	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Atrazine	94.0 - 230	0 / 31	--	--	--	95.5	10.3	98.7	94.8	11.9	-- / --	19.3	**YES**	8.29	8.03	NO[4]	--	-- / --	--	NO[4]
Benzaldehyde	94.0 - 230	1 / 31	29.0	29.0	YS24-SS02-0410	93.4	15.8	98.2	91.2	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Benzo(a)anthracene	180 - 390	10 / 50	32.0	160	YS24-SS31-0410	118	51.5	131	106	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Benzo(a)pyrene	180 - 390	12 / 50	22.0	180	YS24-SS31-0410	117	51.8	130	104	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO

TABLE 7-15

Screening Statistics - Site 24 Surface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
Benzo(b)fluoranthene	180 - 390	15 / 50	23.0	250	YS24-SS31-0410	119	57.3	133	103	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Benzo(g,h,i)perylene	180 - 390	11 / 50	22.0	870	A06SS09-00	134	118	162	110	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Benzo(k)fluoranthene	180 - 390	12 / 50	29.0	300	YS24-SS31-0410	123	56.1	136	109	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
bis(2-Chloroethoxy)methane	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
bis(2-Chloroethyl)ether	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
bis(2-Chloroisopropyl)ether	350 - 390	0 / 14	--	--	--	185	5.36	188	185	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
bis(2-Ethylhexyl)phthalate	180 - 390	13 / 50	41.0	3,600	A06SS11-00	225	503	345	140	30,000	0 / 50	0.12	NO	--	--	NO	--	-- / --	--	NO
Butylbenzylphthalate	180 - 390	4 / 50	44.0	780	A06SS12-00	142	104	166	125	30,000	0 / 50	0.03	NO	--	--	NO	--	-- / --	--	NO
Caprolactam	94.0 - 230	0 / 31	--	--	--	95.5	10.3	98.7	94.8	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Carbazole	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Chrysene	180 - 390	13 / 50	33.0	260	YS24-SS31-0410	122	52.7	135	111	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Dibenz(a,h)anthracene	180 - 390	1 / 50	45.0	45.0	YS24-SS31-0410	129	43.9	139	122	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Dibenzofuran	180 - 390	1 / 50	26.0	26.0	YS24-SS09-0410	128	44.7	139	120	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Diethylphthalate	180 - 390	0 / 50	--	--	--	130	42.5	140	123	26,800	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Dimethyl phthalate	180 - 390	0 / 50	--	--	--	130	42.5	140	123	10,640	-- / --	0.04	NO	--	--	NO	--	-- / --	--	NO
Di-n-butylphthalate	180 - 370	15 / 50	25.0	4,600	A06SS12-00	444	893	655	166	40,000	0 / 50	0.12	NO	--	--	NO	--	-- / --	--	NO
Di-n-octylphthalate	180 - 390	2 / 50	98.0	450	YS24-SS01-0410	135	61.6	150	126	30,000	0 / 50	0.02	NO	--	--	NO	--	-- / --	--	NO
Fluoranthene	180 - 390	18 / 50	23.0	250	YS24-SS31-0410	119	57.6	133	103	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Fluorene	180 - 390	0 / 50	--	--	--	130	42.5	140	123	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Hexachlorobenzene	180 - 390	0 / 50	--	--	--	130	42.5	140	123	1,000	-- / --	0.39	NO	--	--	NO	--	-- / --	--	NO
Hexachlorobutadiene	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Hexachlorocyclopentadiene	180 - 390	0 / 50	--	--	--	130	42.5	140	123	2,000	-- / --	0.20	NO	--	--	NO	--	-- / --	--	NO
Hexachloroethane	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Indeno(1,2,3-cd)pyrene	180 - 390	2 / 50	63.0	150	YS24-SS31-0410	128	42.6	138	122	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Isophorone	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Naphthalene	180 - 390	2 / 50	33.0	42.0	YS24-SS10-0410	127	45.8	138	119	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
n-Nitroso-di-n-propylamine	180 - 390	0 / 50	--	--	--	130	42.5	140	123	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
n-Nitrosodiphenylamine	180 - 390	0 / 50	--	--	--	130	42.5	140	123	1,090	-- / --	0.36	NO	--	--	NO	--	-- / --	--	NO
Nitrobenzene	250 - ####	0 / 50	--	--	--	519	298	590	397	2,260	-- / --	0.66	NO	--	--	NO	--	-- / --	--	NO
PAH (LMW)	855 - ####	21 / 50	636	1,482	A06SS11-00	743	225	796	710	29,000	0 / 50	0.05	NO	--	--	NO	--	-- / --	--	NO
PAH (HMW)	810 - ####	22 / 50	485	1,805	YS24-SS31-0410	752	316	827	700	18,000	0 / 50	0.10	NO	--	--	NO	--	-- / --	--	NO
Pentachlorophenol	350 - 940	0 / 50	--	--	--	281	126	311	257	5,000	-- / --	0.19	NO	--	--	NO	--	-- / --	--	NO
Phenanthrene	190 - 390	17 / 50	26.0	88.0	YS24-SS08-0410	110	57.3	124	93.5	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Phenol	340 - 440	0 / 50	--	--	--	186	8.87	189	186	1,880	-- / --	0.23	NO	--	--	NO	--	-- / --	--	NO
Pyrene	180 - 390	20 / 50	25.0	330	YS24-SS31-0410	120	64.4	135	102	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																				
1,1,1-Trichloroethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	1,025	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
1,1,2,2-Tetrachloroethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	5,000	-- / --	0.002	NO	--	--	NO	--	-- / --	--	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-11	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
1,1,2-Trichloroethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	2,000	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
1,1-Dichloroethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	548	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
1,1-Dichloroethene	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	173	-- / --	0.07	NO	--	--	NO	--	-- / --	--	NO
1,2,4-Trichlorobenzene	0.13 - 390	0 / 50	--	--	--	70.6	88.9	91.6	9.26	1,270	-- / --	0.31	NO	--	--	NO	--	-- / --	--	NO
1,2-Dibromo-3-chloropropane	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
1,2-Dibromoethane	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	300	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO

TABLE 7-15

Screening Statistics - Site 24 Surface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
1,2-Dichlorobenzene	1.50 - 390	0 / 50	--	--	--	70.6	88.9	91.7	9.73	1,000	-- / --	0.39	NO	--	--	NO	--	-- / --	--	NO
1,2-Dichloroethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	2,190	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
1,2-Dichloroethene (total)	10.0 - 12.0	0 / 19	--	--	--	5.55	0.28	5.67	5.55	447	-- / --	0.03	NO	--	--	NO	--	-- / --	--	NO
1,2-Dichloropropane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	38,800	-- / --	0.0003	NO	--	--	NO	--	-- / --	--	NO
1,3-Dichlorobenzene	1.50 - 390	0 / 50	--	--	--	70.6	88.9	91.7	9.73	1,000	-- / --	0.39	NO	--	--	NO	--	-- / --	--	NO
1,4-Dichlorobenzene	#### - 390	1 / 50	52.0	52.0	A06SS13-00	68.0	87.6	88.8	8.98	1,280	0 / 50	0.04	NO	--	--	NO	--	-- / --	--	NO
2-Butanone	2.50 - 13.0	17 / 45	4.00	39.0	YS24-SS02-0410	6.69	6.20	8.25	5.04	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
2-Hexanone	3.70 - 16.0	0 / 50	--	--	--	4.75	1.29	5.06	4.53	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Methyl-2-pentanone	3.70 - 16.0	0 / 50	--	--	--	4.75	1.29	5.06	4.53	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Acetone	10.0 - 340	1 / 50	3.00	3.00	A06SS12-00	40.3	41.3	50.1	21.0	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Benzene	1.50 - 12.0	2 / 50	0.20	0.24	YS24-SS08-0410	3.11	2.01	3.59	2.38	1,140	0 / 50	0.0002	NO	--	--	NO	--	-- / --	--	NO
Bromodichloromethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Bromoform	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	300	-- / --	0.04	NO	--	--	NO	--	-- / --	--	NO
Bromomethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Carbon disulfide	1.50 - 12.0	3 / 50	0.71	3.80	YS24-SS06-0410	3.18	1.97	3.65	2.54	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Carbon tetrachloride	1.50 - 12.0	1 / 50	2.00	2.00	A06TP01-01	3.10	1.92	3.56	2.53	3,400	0 / 50	0.001	NO	--	--	NO	--	-- / --	--	NO
Chlorobenzene	1.50 - 12.0	1 / 50	1.00	1.00	A06SS16-00	3.08	1.94	3.54	2.49	2,400	0 / 50	0.0004	NO	--	--	NO	--	-- / --	--	NO
Chloroethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	5,000	-- / --	0.002	NO	--	--	NO	--	-- / --	--	NO
Chloroform	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	1,844	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Chloromethane	1.50 - 12.0	2 / 50	0.39	0.57	YS24-SS20-0410	3.12	2.00	3.60	2.45	5,000	0 / 50	0.0001	NO	--	--	NO	--	-- / --	--	NO
cis-1,2-Dichloroethene	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	447	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
cis-1,3-Dichloropropene	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	5,000	-- / --	0.002	NO	--	--	NO	--	-- / --	--	NO
Cyclohexane	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	6,000	-- / --	0.001	NO	--	--	NO	--	-- / --	--	NO
Dibromochloromethane	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Dichlorodifluoromethane (Freon-12)	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Ethylbenzene	0.30 - 12.0	2 / 50	1.60	5.00	YS24-SS08-0410	3.22	1.98	3.69	2.52	1,815	0 / 50	0.003	NO	--	--	NO	--	-- / --	--	NO
Isopropylbenzene	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
m- and p-Xylene	2.90 - 13.0	0 / 31	--	--	--	3.42	1.16	3.78	3.22	1,300	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Methyl acetate	2.00 - 5.70	23 / 31	2.80	2,100	YS24-SS03-0410	115	384	232	13.3	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Methylcyclohexane	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Methylene chloride	0.16 - 12.0	0 / 50	--	--	--	2.74	2.18	3.26	1.68	1,250	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Methyl-tert-butyl ether (MTBE)	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
o-Xylene	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	1,300	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Styrene	1.50 - 12.0	1 / 50	0.040	0.040	YS24-SS22-0410	3.16	1.96	3.63	2.43	64,000	0 / 50	0.000001	NO	--	--	NO	--	-- / --	--	NO
Tetrachloroethene	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	179	-- / --	0.07	NO	--	--	NO	--	-- / --	--	NO
Toluene	0.18 - 12.0	5 / 50	0.80	6.00	24SS04	2.24	2.30	2.78	1.01	40,000	0 / 50	0.0002	NO	--	--	NO	--	-- / --	--	NO
trans-1,2-Dichloroethene	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	447	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
trans-1,3-Dichloropropene	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	5,000	-- / --	0.002	NO	--	--	NO	--	-- / --	--	NO
Trichloroethene	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	500	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Trichlorofluoromethane (Freon-11)	1.50 - 6.60	0 / 31	--	--	--	1.72	0.58	1.89	1.61	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Vinyl chloride	1.50 - 12.0	0 / 50	--	--	--	3.17	1.94	3.63	2.58	412	-- / --	0.03	NO	--	--	NO	--	-- / --	--	NO
Xylene, total	1.50 - 12.0	2 / 50	1.00	1.00	24SS03	2.90	1.91	3.36	2.33	1,300	0 / 50	0.001	NO	--	--	NO	--	-- / --	--	NO
Explosives (UG/KG)																				
1,3,5-Trinitrobenzene	250 - ####	0 / 45	--	--	--	556	293	629	430	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
1,3-Dinitrobenzene	250 - ####	0 / 45	--	--	--	556	293	629	430	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO

TABLE 7-15

Screening Statistics - Site 24 Surface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
2,4,6-Trinitrotoluene	250 - ####	0 / 45	--	--	--	556	293	629	430	10,000	-- / --	0.15	NO	--	--	NO	--	-- / --	--	NO
2-Amino-4,6-dinitrotoluene	250 - ####	0 / 36	--	--	--	663	219	725	585	80,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
2-Nitrotoluene	250 - ####	0 / 45	--	--	--	1,072	644	1,233	692	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
3-Nitrotoluene	220 - ####	0 / 45	--	--	--	1,069	648	1,232	675	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Amino-2,6-dinitrotoluene	250 - ####	0 / 45	--	--	--	556	293	629	430	80,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
4-Nitrotoluene	250 - ####	0 / 36	--	--	--	1,309	482	1,445	1,062	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
HMX	500 - ####	0 / 45	--	--	--	594	234	653	533	10,000	-- / --	0.15	NO	--	--	NO	--	-- / --	--	NO
RDX	500 - ####	0 / 45	--	--	--	594	234	653	533	10,000	-- / --	0.15	NO	--	--	NO	--	-- / --	--	NO
Tetryl	650 - ####	0 / 43	--	--	--	1,117	557	1,260	912	10,000	-- / --	0.30	NO	--	--	NO	--	-- / --	--	NO
Other Parameters																				
pH	-- - --	38 / 38	4.87	8.35	YS24-SS08-0410	6.07	0.99	6.34	6.00	--	-- / --	--	--	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	33 / 33	2,262	76,070	YS24-SS06-0410	15,644	13,744	19,697	12,159	--	-- / --	--	--	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - Macronutrient - Not considered to be a COPC

4 - See uncertainty section

5 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-16

Physical Parameter Measurements - Surface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Sample ID	Date	Area	Total Organic Carbon		pH	Grain Size (percent)				
			mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/ Clay
Surface Soils										
24SS01	9/9/1997	Outside of Estimated Waste Boundary	29,000	2.90	6.40	NS	NS	NS	NS	NS
24SS02	9/9/1997	Drainages	4,700	0.47	5.30	NS	NS	NS	NS	NS
24SS03	9/9/1997	Drainages	NS	NS	NS	NS	NS	NS	NS	NS
24SS03D	9/9/1997	Drainages	NS	NS	NS	NS	NS	NS	NS	NS
24SS04	9/9/1997	Drainages	NS	NS	NS	NS	NS	NS	NS	NS
24SS05	9/9/1997	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS06-00	11/6/1994	Inside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS07-00	11/6/1994	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS08-00	11/6/1994	Inside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS08D-00	11/6/1994	Inside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS09-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS10-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS11-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS12-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS12-00D	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06SS13-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	5.67	NS	NS	NS	NS	NS
A06SS14-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	5.34	NS	NS	NS	NS	NS
A06SS15-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	5.67	NS	NS	NS	NS	NS
A06SS16-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	4.93	NS	NS	NS	NS	NS
A06SS17-00	11/7/1994	Outside of Estimated Waste Boundary	NS	NS	5.53	NS	NS	NS	NS	NS
A06TP01-01	11/16/1994	Inside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
A06TP05-01	11/15/1994	Inside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
YS24-SS01-0410	4/16/2010	Outside of Estimated Waste Boundary	10,790	1.08	5.75	5.20	10.00	30.90	50.20	3.70
YS24-SS01P-0410	4/16/2010	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
YS24-SS02-0410	4/16/2010	Outside of Estimated Waste Boundary	28,410	2.84	5.26	2.50	5.60	25.80	60.10	6.00
YS24-SS03-0410	4/16/2010	Outside of Estimated Waste Boundary	11,380	1.14	5.22	0.10	3.90	43.00	48.40	4.60
YS24-SS04-0410	4/15/2010	Outside of Estimated Waste Boundary	10,620	1.06	7.99	22.60	13.50	28.30	34.10	1.50
YS24-SS05-0410	4/15/2010	Outside of Estimated Waste Boundary	2,262	0.23	8.06	7.70	12.80	53.90	24.70	0.90
YS24-SS06-0410	4/15/2010	Outside of Estimated Waste Boundary	76,070	7.61	7.69	0.40	11.20	45.00	41.20	2.20

TABLE 7-16

Physical Parameter Measurements - Surface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Sample ID	Date	Area	Total Organic Carbon		pH	Grain Size (percent)				
			mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/ Clay
YS24-SS07-0410	4/19/2010	Outside of Estimated Waste Boundary	14,910	1.49	5.37	0.30	3.50	23.50	63.70	9.00
YS24-SS08-0410	4/15/2010	Outside of Estimated Waste Boundary	5,832	0.58	8.35	24.00	15.00	35.90	24.00	1.10
YS24-SS09-0410	4/19/2010	Sludge Area	43,860	4.39	5.00	1.80	7.10	29.50	59.70	1.90
YS24-SS10-0410	4/20/2010	Sludge Area	21,750	2.18	4.87	0.20	2.80	25.10	70.80	1.10
YS24-SS11-0410	4/16/2010	Outside of Estimated Waste Boundary	8,592	0.86	5.45	0.20	1.30	21.00	72.00	5.50
YS24-SS11P-0410	4/16/2010	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
YS24-SS12-0410	4/16/2010	Outside of Estimated Waste Boundary	20,040	2.00	6.02	2.10	9.80	26.70	56.00	5.40
YS24-SS13-0410	4/16/2010	Outside of Estimated Waste Boundary	17,190	1.72	5.95	1.60	12.30	34.00	49.70	2.40
YS24-SS14-0410	4/16/2010	Inside of Estimated Waste Boundary	15,080	1.51	6.00	1.80	11.70	31.70	52.30	2.50
YS24-SS15-0410	4/16/2010	Inside of Estimated Waste Boundary	10,830	1.08	6.58	1.90	11.00	28.60	54.70	3.80
YS24-SS16-0410	4/15/2010	Outside of Estimated Waste Boundary	12,040	1.20	6.78	3.60	8.60	22.10	62.00	3.70
YS24-SS17-0410	4/15/2010	Outside of Estimated Waste Boundary	19,460	1.95	5.41	0.00	2.20	20.50	74.60	2.70
YS24-SS18-0410	4/15/2010	Outside of Estimated Waste Boundary	11,780	1.18	6.00	4.20	0.80	16.80	73.40	4.80
YS24-SS19-0410	4/15/2010	Outside of Estimated Waste Boundary	13,460	1.35	5.85	0.30	2.20	20.90	74.00	2.60
YS24-SS20-0410	4/15/2010	Inside of Estimated Waste Boundary	8,444	0.84	5.20	0.20	2.20	20.00	71.40	6.20
YS24-SS21-0410	4/16/2010	Outside of Estimated Waste Boundary	16,660	1.67	5.45	0.20	7.60	32.90	57.20	2.10
YS24-SS22-0410	4/14/2010	Drainages	3,909	0.39	5.55	0.20	10.20	33.20	54.10	2.30
YS24-SS23-0410	4/14/2010	Drainages	20,740	2.07	8.20	19.40	17.30	33.50	28.30	1.50
YS24-SS24-0410	4/14/2010	Drainages	4,796	0.48	6.13	1.00	8.90	19.20	68.60	2.30
YS24-SS25-0410	4/14/2010	Drainages	6,708	0.67	5.08	1.00	6.10	26.40	63.20	3.30
YS24-SS26-0410	4/14/2010	Drainages	16,160	1.62	6.55	4.20	8.50	26.50	58.30	2.50
YS24-SS26P-0410	4/14/2010	Drainages	NS	NS	NS	NS	NS	NS	NS	NS
YS24-SS27-0410	4/14/2010	Drainages	8,456	0.85	5.44	0.70	2.40	37.40	57.60	1.90
YS24-SS28-0410	4/14/2010	Drainages	14,200	1.42	5.76	0.00	4.80	30.90	61.90	2.40
YS24-SS29-0410	4/14/2010	Drainages	5,448	0.54	7.19	0.00	0.60	34.60	61.70	3.10
YS24-SS30-0410	4/14/2010	Drainages	12,920	1.29	7.72	2.00	3.20	23.60	66.60	4.60
YS24-SS31-0410	4/14/2010	Drainages	9,767	0.98	5.97	0.90	1.80	18.40	75.70	3.20

TABLE 7-16

Physical Parameter Measurements - Surface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Sample ID	Date	Area	Total Organic Carbon		pH	Grain Size (percent)				
			mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/ Clay
Subsurface Soils										
A06SB03-01	11/15/1994	Outside of Estimated Waste Boundary	NS	NS	5.54	NS	NS	NS	NS	NS
A06SB03-01D	11/15/1994	Outside of Estimated Waste Boundary	NS	NS	5.52	NS	NS	NS	NS	NS
A06SB04-01	11/4/1994	Outside of Estimated Waste Boundary	NS	NS	5.80	NS	NS	NS	NS	NS
A06SB05-01	11/8/1994	Outside of Estimated Waste Boundary	NS	NS	5.48	NS	NS	NS	NS	NS
A06SB06-01	11/6/1994	Outside of Estimated Waste Boundary	NS	NS	5.57	NS	NS	NS	NS	NS
A06SB10-01	11/8/1994	Outside of Estimated Waste Boundary	NS	NS	5.45	NS	NS	NS	NS	NS
YS24-SB01-0_5-2-0410	4/16/2010	Outside of Estimated Waste Boundary	8,265	0.83	7.20	10.50	9.10	34.30	43.90	2.20
YS24-SB02-0_5-2-0410	4/16/2010	Outside of Estimated Waste Boundary	6,827	0.68	7.12	1.00	5.80	30.50	56.50	6.20
YS24-SB02P-0_5-2-0410	4/16/2010	Outside of Estimated Waste Boundary	NS	NS	NS	NS	NS	NS	NS	NS
YS24-SB03-0_5-2-0410	4/16/2010	Outside of Estimated Waste Boundary	2,771	0.28	5.76	0.20	8.90	36.70	53.60	0.60
YS24-SB04-0_5-2-0410	4/15/2010	Outside of Estimated Waste Boundary	3,655	0.37	7.93	3.00	9.20	28.30	56.00	3.50
YS24-SB05-0_5-2-0410	4/15/2010	Outside of Estimated Waste Boundary	7,269	0.73	8.23	4.10	7.80	37.70	47.40	3.00
YS24-SB06-0_5-2-0410	4/15/2010	Outside of Estimated Waste Boundary	9,577	0.96	8.06	0.50	5.60	37.80	45.70	10.40
YS24-SB07-0_5-2-0410	4/19/2010	Outside of Estimated Waste Boundary	5,792	0.58	5.46	1.50	6.20	28.80	62.30	1.20
YS24-SB08-0_5-2-0410	4/15/2010	Outside of Estimated Waste Boundary	7,436	0.74	8.35	24.10	17.80	32.70	24.90	0.50
YS24-SB09-0_5-2-0410	4/19/2010	Sludge Area	12,140	1.21	4.61	0.60	5.70	29.60	62.40	1.70

Shaded cells indicate field duplicates

NS - Not Sampled

TABLE 7-17

Screening Statistics - Site 24 Surface Soil - Drainage Ditch Samples

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																				
Aluminum	-- - --	13 / 13	3,130	11,900	YS24-SS28-0410	6,682	2,590	7,963	6,248	pH < 5.5	3 / 11	--	**YES**	mean pH in range		NO	12,200	0 / 13	0.98	NO
Arsenic	0.32 - 1.20	7 / 13	1.80	151	YS24-SS31-0410	13.5	41.4	34.0	1.56	18.0	1 / 13	8.39	**YES**	1.89	0.75	**YES**	6.36	2 / 13	23.7	**YES**
Copper	-- - --	13 / 13	1.20	5.70	24SS04	3.36	1.54	4.12	3.00	70.0	0 / 13	0.08	NO	--	--	NO	--	-- / --	--	NO
Iron	-- - --	13 / 13	2,700	15,100	24SS04	5,848	3,482	7,570	5,107	5 < pH > 8	1 / 11	--	**YES**	mean pH in range		NO	19,900	0 / 13	0.76	NO
Manganese	-- - --	13 / 13	12.5	113	YS24-SS31-0410	51.0	36.0	68.8	39.3	220	0 / 13	0.51	NO	--	--	NO	--	-- / --	--	NO
Mercury	#### - ####	10 / 13	0.018	0.54	YS24-SS22-0410	0.074	0.14	0.14	0.038	0.10	2 / 13	5.40	**YES**	1.45	0.74	**YES**	0.111	1 / 13	4.86	**YES**
Selenium	0.52 - 0.92	0 / 13	--	--	--	0.32	0.073	0.35	0.31	0.52	-- / --	1.77	**YES**	0.68	0.61	NO	--	-- / --	--	NO
Thallium	1.00 - 1.30	0 / 13	--	--	--	0.58	0.048	0.60	0.58	1.00	-- / --	1.30	**YES**	0.60	0.58	NO	--	-- / --	--	NO
Pesticides (UG/KG)																				
alpha-Chlordane	1.70 - 2.20	6 / 13	0.26	1.00	YS24-SS26-0410	0.76	0.31	0.92	0.68	11.0	0 / 13	0.09	NO	--	--	NO	--	-- / --	--	NO
gamma-Chlordane	1.70 - 2.20	7 / 13	0.25	1.30	YS24-SS31-0410	0.78	0.36	0.95	0.68	11.0	0 / 13	0.12	NO	--	--	NO	--	-- / --	--	NO
Toxaphene	89.0 - 190	0 / 13	--	--	--	57.0	19.1	66.5	54.7	500	-- / --	0.38	NO	--	--	NO	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																				
4-Nitrophenol	350 - 900	0 / 13	--	--	--	244	108	298	227	380	-- / --	2.37	**YES**	0.78	0.64	NO	--	-- / --	--	NO
Atrazine	180 - 220	0 / 10	--	--	--	96.5	5.80	99.9	96.3	11.9	-- / --	18.5	**YES**	8.39	8.11	NO[3]	--	-- / --	--	NO[3]
Benzaldehyde	180 - 220	0 / 10	--	--	--	96.5	5.80	99.9	96.3	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Dibenzofuran	180 - 370	0 / 13	--	--	--	115	36.4	133	111	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																				
2-Butanone	2.50 - 11.0	4 / 13	8.10	16.0	YS24-SS23-0410	5.52	4.16	7.58	4.23	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Acetone	10.0 - 210	0 / 13	--	--	--	47.6	37.2	66.0	29.0	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Carbon disulfide	1.50 - 11.0	0 / 13	--	--	--	2.05	1.89	2.98	1.51	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Methyl acetate	2.50 - 2.50	9 / 10	4.80	560	YS24-SS29-0410	104	174	205	30.0	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - See uncertainty section

4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-18

Screening Statistics - Site 24 Surface Soil - Samples From Outside of Estimated Waste Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																				
Aluminum	-- - --	28 / 28	1,760	9,980	YS24-SS06-0410	5,930	1,851	6,526	5,581	pH < 5.5	8 / 22	--	**YES**	mean pH in range		NO	12,200	0 / 28	0.82	NO
Arsenic	0.78 - 1.20	22 / 28	0.64	70.4	YS24-SS04-0410	4.23	13.1	8.44	1.53	18.0	1 / 28	3.91	**YES**	0.47	0.24	NO	--	-- / --	--	NO
Copper	1.30 - 3.30	24 / 28	1.30	139	A06SS11-00	9.45	25.9	17.8	3.75	70.0	1 / 28	1.99	**YES**	0.25	0.14	NO	--	-- / --	--	NO
Iron	-- - --	28 / 28	1,510	17,700	YS24-SS06-0410	5,555	4,198	6,906	4,436	5 < pH > 8	3 / 22	--	**YES**	mean pH in range		NO	19,900	0 / 28	0.89	NO
Manganese	-- - --	28 / 28	19.3	963	YS24-SS12-0410	109	172	164	74.5	220	1 / 28	4.38	**YES**	0.75	0.49	NO	--	-- / --	--	NO
Mercury	#### - 0.11	15 / 28	0.021	4.70	A06SS11-00	0.21	0.88	0.49	0.044	0.10	1 / 28	47.0	**YES**	4.91	2.08	**YES**	0.111	1 / 28	42.3	**YES**
Selenium	0.54 - 0.87	3 / 28	0.58	0.78	A06SS12-00	0.34	0.13	0.38	0.32	0.52	3 / 28	1.50	**YES**	0.73	0.65	NO	--	-- / --	--	NO
Thallium	0.84 - 1.30	0 / 28	--	--	--	0.53	0.072	0.55	0.52	1.00	-- / --	1.30	**YES**	0.55	0.53	NO	--	-- / --	--	NO
Pesticides (UG/KG)																				
alpha-Chlordane	1.80 - 2.00	8 / 28	0.18	74.0	A06SS11-00	3.50	13.8	7.95	0.94	11.0	1 / 28	6.73	**YES**	0.72	0.32	NO	--	-- / --	--	NO
gamma-Chlordane	1.80 - 2.00	8 / 28	0.24	76.0	A06SS11-00	3.52	14.2	8.10	0.93	11.0	1 / 28	6.91	**YES**	0.74	0.32	NO	--	-- / --	--	NO
Toxaphene	91.0 - 990	0 / 28	--	--	--	81.5	84.1	109	67.4	500	-- / --	1.98	**YES**	0.22	0.16	NO	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																				
4-Nitrophenol	360 - 940	0 / 28	--	--	--	299	128	340	274	380	-- / --	2.47	**YES**	0.90	0.79	NO	--	-- / --	--	NO
Atrazine	94.0 - 230	0 / 16	--	--	--	94.8	13.7	101	93.5	11.9	-- / --	19.3	**YES**	8.47	7.97	NO[3]	--	-- / --	--	NO[3]
Benzaldehyde	94.0 - 230	1 / 16	29.0	29.0	YS24-SS02-0410	90.7	21.4	100	86.8	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Dibenzofuran	190 - 390	0 / 28	--	--	--	134	42.9	148	128	NSV	-- / --	NSV	NO	--	NSV	NO	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																				
2-Butanone	2.50 - 13.0	9 / 23	4.00	39.0	YS24-SS02-0410	7.87	7.68	10.6	5.85	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Acetone	10.0 - 340	1 / 28	3.00	3.00	A06SS12-00	38.9	43.8	53.0	18.7	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Carbon disulfide	3.10 - 12.0	3 / 28	0.71	3.80	YS24-SS06-0410	3.60	1.84	4.19	3.08	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Methyl acetate	2.00 - 5.70	10 / 16	4.40	2,100	YS24-SS03-0410	156	521	384	10.7	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - See uncertainty section

4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-19

Screening Statistics - Site 24 Surface Soil - Samples From Inside of Estimated Waste Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																				
Aluminum	-- - --	7 / 7	4,310	8,120	YS24-SS14-0410	6,351	1,585	7,515	6,177	pH < 5.5	1 / 3	NSV	**YES**	mean pH in range		NO	12,200	0 / 7	0.67	NO
Arsenic	0.34 - 0.34	6 / 7	1.00	2.90	YS24-SS15-0410	1.71	0.95	2.41	1.31	18.0	0 / 7	0.16	NO	--	--	NO	--	-- / --	--	NO
Copper	-- - --	7 / 7	1.30	44.7	YS24-SS20-0410	14.4	18.9	28.3	6.37	70.0	0 / 7	0.64	NO	--	--	NO	--	-- / --	--	NO
Iron	-- - --	7 / 7	3,010	7,370	YS24-SS14-0410	4,889	1,877	6,267	4,593	5 < pH > 8	0 / 3	NSV	NO	mean pH in range		NO	19,900	0 / 7	0.37	NO
Manganese	-- - --	7 / 7	20.2	171	A06SS08-00	76.2	52.9	115	62.0	220	0 / 7	0.78	NO	--	--	NO	--	-- / --	--	NO
Mercury	0.10 - 0.12	3 / 7	0.023	0.25	YS24-SS20-0410	0.082	0.077	0.14	0.063	0.10	1 / 7	2.50	**YES**	1.39	0.82	**YES**	0.111	1 / 7	2.25	**YES**
Selenium	0.55 - 0.59	1 / 7	0.62	0.62	A06SS08-00	0.33	0.13	0.43	0.32	0.52	1 / 7	1.19	**YES**	0.82	0.64	NO	--	-- / --	--	NO
Thallium	0.87 - 1.10	0 / 7	--	--	--	0.49	0.054	0.53	0.49	1.00	-- / --	1.10	**YES**	0.53	0.49	NO	--	-- / --	--	NO
Pesticides (UG/KG)																				
alpha-Chlordane	1.90 - 2.00	2 / 7	0.23	3.40	YS24-SS20-0410	1.23	1.00	1.96	0.96	11.0	0 / 7	0.31	NO	--	--	NO	--	-- / --	--	NO
gamma-Chlordane	1.90 - 2.00	2 / 7	0.37	2.10	YS24-SS20-0410	1.06	0.51	1.44	0.96	11.0	0 / 7	0.19	NO	--	--	NO	--	-- / --	--	NO
Toxaphene	93.0 - 200	0 / 7	--	--	--	76.5	27.8	96.9	71.7	500	-- / --	0.40	NO	--	--	NO	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																				
4-Nitrophenol	370 - 930	0 / 7	--	--	--	343	146	450	313	380	-- / --	2.45	**YES**	1.18	0.90	NO[3]	--	-- / --	--	NO[3]
Atrazine	190 - 200	0 / 3	--	--	--	96.7	2.89	102	96.6	11.9	-- / --	16.8	**YES**	8.53	8.12	NO[3]	--	-- / --	--	NO[3]
Benzaldehyde	190 - 200	0 / 3	--	--	--	96.7	2.89	102	96.6	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Dibenzofuran	190 - 380	0 / 7	--	--	--	149	49.3	185	142	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																				
2-Butanone	4.20 - 12.0	3 / 7	4.00	15.0	YS24-SS14-0410	5.89	4.27	9.03	4.94	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Acetone	11.0 - 280	0 / 7	--	--	--	33.4	48.7	69.2	16.0	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Carbon disulfide	3.30 - 12.0	0 / 7	--	--	--	4.04	1.99	5.50	3.54	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Methyl acetate	5.10 - 5.10	2 / 3	2.80	8.20	YS24-SS14-0410	4.52	3.19	9.90	3.88	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - See uncertainty section

4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-20

Screening Statistics - Site 24 Surface Soil - Samples From the Sludge Area

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance [1]	Maximum Hazard Quotient	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance [4]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																				
Aluminum	-- - --	2 / 2	4,160	4,590	YS24-SS10-0410	4,375	304	5,732	4,370	pH < 5.5	2 / 2	--	**YES**	mean pH < 5.5		**YES**	12,200	0 / 2	0.38	NO
Arsenic	1.50 - 1.60	0 / 2	--	--	--	0.78	0.035	0.93	0.77	18.0	-- / --	0.09	NO	--	--	NO	--	-- / --	--	NO
Copper	-- - --	2 / 2	2.80	6.50	YS24-SS09-0410	4.65	2.62	16.3	4.27	70.0	0 / 2	0.09	NO	--	--	NO	--	-- / --	--	NO
Iron	-- - --	2 / 2	4,660	5,400	YS24-SS10-0410	5,030	523	7,366	5,016	5 < pH > 8	2 / 2	--	**YES**	mean pH < 5		**YES**	19,900	0 / 2	0.27	NO
Manganese	-- - --	2 / 2	132	245	YS24-SS10-0410	189	79.9	545	180	220	1 / 2	1.11	**YES**	2.48	0.86	**YES**	324	0 / 2	0.76	NO
Mercury	#### - ####	0 / 2	--	--	--	0.015	0.0021	0.024	0.015	0.10	-- / --	0.33	NO	0.24	0.15	NO	--	-- / --	--	NO
Selenium	0.53 - 0.55	0 / 2	--	--	--	0.27	0.0071	0.30	0.27	0.52	-- / --	1.06	**YES**	0.58	0.52	NO	--	-- / --	--	NO
Thallium	1.10 - 1.10	0 / 2	--	--	--	0.55	0.0	0.55	0.55	1.00	-- / --	1.10	**YES**	0.55	0.55	NO	--	-- / --	--	NO
Pesticides (UG/KG)																				
alpha-Chlordane	1.90 - 1.90	1 / 2	1.20	1.20	YS24-SS09-0410	1.08	0.18	1.86	1.07	11.0	0 / 2	0.11	NO	--	--	NO	--	-- / --	--	NO
gamma-Chlordane	1.90 - 1.90	0 / 2	--	--	--	0.95	0.0	0.95	0.95	11.0	-- / --	0.17	NO	--	--	NO	--	-- / --	--	NO
Toxaphene	91.0 - 91.0	0 / 2	--	--	--	45.5	0.0	45.5	45.5	500	-- / --	0.18	NO	--	--	NO	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																				
4-Nitrophenol	360 - 360	0 / 2	--	--	--	180	0.0	180	180	380	-- / --	0.95	NO	--	--	NO	--	-- / --	--	NO
Atrazine	190 - 190	0 / 2	--	--	--	95.0	0.0	95.0	95.0	11.9	-- / --	16.0	**YES**	7.98	7.98	NO [3]	--	-- / --	--	NO [3]
Benzaldehyde	190 - 190	0 / 2	--	--	--	95.0	0.0	95.0	95.0	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Dibenzofuran	190 - 190	1 / 2	26.0	26.0	YS24-SS09-0410	60.5	48.8	278	49.7	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Volatile Organic Compounds (UG/KG)																				
2-Butanone	3.60 - 3.60	1 / 2	5.50	5.50	YS24-SS10-0410	3.65	2.62	15.3	3.15	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Acetone	67.0 - 77.0	0 / 2	--	--	--	36.0	3.54	51.8	35.9	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Carbon disulfide	3.20 - 3.40	0 / 2	--	--	--	1.65	0.071	1.97	1.65	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Methyl acetate	-- - --	2 / 2	3.90	18.0	YS24-SS09-0410	11.0	9.97	55.5	8.38	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - See uncertainty section

4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-21

Screening Statistics - Site 24 Subsurface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance [1]	m Hazard Quotient [2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																				
Aluminum	-- - --	14 / 14	2,670	7,930	YS24-SB03-0_5-2-0410	5,466	1,494	6,174	5,257	pH < 5.5	4 / 14	--	**YES**	mean pH in range		NO	12,200	0 / 14	0.65	NO
Antimony	1.10 - 3.30	5 / 13	0.32	1.50	YS24-SB04-0_5-2-0410	0.87	0.49	1.11	0.75	78.0	0 / 13	0.02	NO	--	--	NO	--	-- / --	--	NO
Arsenic	1.10 - 2.30	11 / 14	0.63	113	YS24-SB04-0_5-2-0410	9.65	29.8	23.7	1.80	18.0	1 / 14	6.28	**YES**	1.32	0.54	**YES**	5.54	1 / 14	20.4	**YES**
Barium	-- - --	14 / 14	19.5	40.0	A06SB05-01	30.3	6.46	33.4	29.7	330	0 / 14	0.12	NO	--	--	NO	--	-- / --	--	NO
Beryllium	0.13 - 0.23	10 / 14	0.070	0.78	YS24-SB04-0_5-2-0410	0.27	0.21	0.36	0.20	40.0	0 / 14	0.02	NO	--	--	NO	--	-- / --	--	NO
Cadmium	0.33 - 0.55	10 / 14	0.040	0.90	YS24-SB04-0_5-2-0410	0.37	0.27	0.50	0.27	32.0	0 / 14	0.03	NO	--	--	NO	--	-- / --	--	NO
Calcium [3]	-- - --	14 / 14	107	212,000	YS24-SB08-0_5-2-0410	18,956	56,318	45,612	1,150	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Chromium	-- - --	14 / 14	3.00	17.6	YS24-SB06-0_5-2-0410	8.47	4.45	10.6	7.55	64.0	0 / 14	0.28	NO	--	--	NO	--	-- / --	--	NO
Cobalt	-- - --	14 / 14	0.81	6.80	A06SB10-01	2.41	1.77	3.25	1.93	13.0	0 / 14	0.52	NO	--	--	NO	--	-- / --	--	NO
Copper	2.80 - 2.80	13 / 14	1.30	23.3	A06SB05-01	5.37	5.71	8.08	3.81	70.0	0 / 14	0.33	NO	--	--	NO	--	-- / --	--	NO
Cyanide	0.52 - 3.40	0 / 14	--	--	--	0.71	0.60	0.99	0.50	15.8	-- / --	0.22	NO	--	--	NO	--	-- / --	--	NO
Iron	-- - --	14 / 14	1,720	14,700	YS24-SB06-0_5-2-0410	6,284	3,908	8,133	5,306	5 < pH > 8	4 / 14	--	**YES**	mean pH in range		NO	19,900	0 / 14	0.74	NO
Lead	-- - --	14 / 14	4.70	18.0	YS24-SB04-0_5-2-0410	9.82	4.14	11.8	9.06	120	0 / 14	0.15	NO	--	--	NO	--	-- / --	--	NO
Magnesium [3]	-- - --	14 / 14	185	2,790	YS24-SB08-0_5-2-0410	673	710	1,009	479	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Manganese	-- - --	14 / 14	14.4	151	A06SB10-01	79.9	42.3	99.9	65.8	220	0 / 14	0.69	NO	--	--	NO	--	-- / --	--	NO
Mercury	#### - 0.11	6 / 14	0.018	0.56	A06SB05-01	0.070	0.14	0.14	0.034	0.10	1 / 14	5.60	**YES**	1.37	0.70	**YES**	0.14	1 / 14	4.00	**YES**
Nickel	3.60 - 3.60	13 / 14	1.20	7.60	YS24-SB06-0_5-2-0410	3.46	1.86	4.34	3.00	38.0	0 / 14	0.20	NO	--	--	NO	--	-- / --	--	NO
Potassium [3]	210 - 210	13 / 14	162	1,830	YS24-SB04-0_5-2-0410	524	541	780	360	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Selenium	0.53 - 0.70	0 / 14	--	--	--	0.29	0.022	0.30	0.29	0.52	-- / --	1.35	**YES**	0.58	0.56	NO	--	-- / --	--	NO
Silver	0.44 - 0.62	1 / 14	1.20	1.20	A06SB03-01	0.33	0.25	0.45	0.30	560	0 / 14	0.002	NO	--	--	NO	--	-- / --	--	NO
Sodium [3]	-- - --	14 / 14	19.8	2,070	YS24-SB08-0_5-2-0410	275	526	523	129	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Thallium	0.88 - 1.20	0 / 14	--	--	--	0.53	0.058	0.56	0.53	1.00	-- / --	1.20	**YES**	0.56	0.53	NO	--	-- / --	--	NO
Vanadium	-- - --	14 / 14	4.50	19.6	YS24-SB04-0_5-2-0410	11.3	4.29	13.3	10.5	130	0 / 14	0.15	NO	--	--	NO	--	-- / --	--	NO
Zinc	-- - --	14 / 14	6.40	61.1	A06SB05-01	22.6	15.1	29.8	18.4	120	0 / 14	0.51	NO	--	--	NO	--	-- / --	--	NO
Pesticides (UG/KG)																				
4,4'-DDD	3.60 - 4.10	1 / 14	1.30	1.30	A06SB05-01	1.84	0.17	1.92	1.83	583	0 / 14	0.002	NO	--	--	NO	--	-- / --	--	NO
4,4'-DDE	3.60 - 4.10	2 / 14	0.77	2.20	A06SB05-01	1.83	0.32	1.98	1.79	114	0 / 14	0.02	NO	--	--	NO	--	-- / --	--	NO
4,4'-DDT	3.60 - 4.10	4 / 14	0.57	1.40	A06SB05-01	1.63	0.45	1.84	1.54	100	0 / 14	0.01	NO	--	--	NO	--	-- / --	--	NO
Aldrin	1.80 - 2.10	0 / 13	--	--	--	0.96	0.042	0.98	0.96	3.63	-- / --	0.58	NO	--	--	NO	--	-- / --	--	NO
alpha-BHC	1.80 - 2.10	1 / 14	1.90	1.90	A06SB05-01	1.03	0.25	1.15	1.01	226	0 / 14	0.01	NO	--	--	NO	--	-- / --	--	NO
alpha-Chlordane	1.80 - 2.10	3 / 13	0.25	0.49	YS24-SB07-0_5-2-0410	0.82	0.28	0.96	0.75	11.0	0 / 13	0.04	NO	--	--	NO	--	-- / --	--	NO
beta-BHC	0.93 - 2.00	1 / 14	1.10	1.10	A06SB05-01	0.77	0.25	0.88	0.72	342	0 / 14	0.003	NO	--	--	NO	--	-- / --	--	NO
delta-BHC	1.80 - 2.10	1 / 13	0.25	0.25	YS24-SB07-0_5-2-0410	0.91	0.20	1.01	0.87	226	0 / 13	0.001	NO	--	--	NO	--	-- / --	--	NO
Dieldrin	3.60 - 4.10	1 / 14	1.70	1.70	A06SB05-01	1.87	0.085	1.91	1.87	10.5	0 / 14	0.16	NO	--	--	NO	--	-- / --	--	NO
Endosulfan I	1.80 - 2.10	0 / 13	--	--	--	0.96	0.042	0.98	0.96	6.32	-- / --	0.33	NO	--	--	NO	--	-- / --	--	NO
Endosulfan II	3.60 - 4.10	0 / 13	--	--	--	1.88	0.072	1.92	1.88	6.32	-- / --	0.65	NO	--	--	NO	--	-- / --	--	NO
Endosulfan sulfate	3.60 - 4.10	0 / 13	--	--	--	1.88	0.072	1.92	1.88	6.32	-- / --	0.65	NO	--	--	NO	--	-- / --	--	NO
Endrin	3.60 - 4.10	1 / 13	0.38	0.38	YS24-SB01-0_5-2-0410	1.77	0.42	1.98	1.66	1.95	0 / 13	0.19	NO	--	--	NO	--	-- / --	--	NO
Endrin aldehyde	3.60 - 4.10	4 / 13	0.37	0.66	YS24-SB04-0_5-2-0410	1.47	0.67	1.80	1.25	1.95	0 / 13	0.34	NO	--	--	NO	--	-- / --	--	NO
Endrin ketone	3.60 - 4.10	0 / 13	--	--	--	1.88	0.072	1.92	1.88	1.95	-- / --	2.10	**YES**	0.98	0.96	NO	--	-- / --	--	NO
gamma-BHC (Lindane)	1.80 - 2.10	0 / 13	--	--	--	0.96	0.042	0.98	0.96	7.75	-- / --	0.27	NO	--	--	NO	--	-- / --	--	NO
gamma-Chlordane	1.80 - 2.10	4 / 13	0.24	0.43	YS24-SB06-0_5-2-0410	0.76	0.32	0.92	0.67	11.0	0 / 13	0.04	NO	--	--	NO	--	-- / --	--	NO
Heptachlor	1.80 - 2.10	0 / 13	--	--	--	0.96	0.042	0.98	0.96	52.9	-- / --	0.04	NO	--	--	NO	--	-- / --	--	NO

TABLE 7-21

Screening Statistics - Site 24 Subsurface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance [1]	m Hazard Quotient [2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
Heptachlor epoxide	1.80 - 2.10	0 / 13	--	--	--	0.96	0.042	0.98	0.96	52.9	-- / --	0.04	NO	--	--	NO	--	-- / --	--	NO
Methoxychlor	18.0 - 21.0	0 / 13	--	--	--	9.62	0.42	9.82	9.61	500	-- / --	0.04	NO	--	--	NO	--	-- / --	--	NO
Toxaphene	90.0 - 200	0 / 13	--	--	--	62.1	23.8	73.9	58.5	500	-- / --	0.40	NO	--	--	NO	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																				
Aroclor-1016	26.0 - 38.0	0 / 13	--	--	--	15.3	2.48	16.5	15.1	8,000	-- / --	0.005	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1221	37.0 - 78.0	0 / 13	--	--	--	25.2	9.02	29.7	23.9	8,000	-- / --	0.010	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1232	18.0 - 38.0	0 / 13	--	--	--	12.4	4.41	14.6	11.8	8,000	-- / --	0.005	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1242	18.0 - 38.0	0 / 13	--	--	--	12.4	4.41	14.6	11.8	8,000	-- / --	0.005	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1248	18.0 - 38.0	0 / 13	--	--	--	12.4	4.41	14.6	11.8	8,000	-- / --	0.005	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1254	18.0 - 38.0	0 / 13	--	--	--	12.4	4.41	14.6	11.8	8,000	-- / --	0.005	NO	--	--	NO	--	-- / --	--	NO
Aroclor-1260	18.0 - 38.0	0 / 13	--	--	--	12.4	4.41	14.6	11.8	8,000	-- / --	0.005	NO	--	--	NO	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																				
1,1-Biphenyl	180 - 210	0 / 9	--	--	--	96.1	4.86	99.1	96.0	13,600	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
2,2'-Oxybis(1-chloropropane)	180 - 210	0 / 9	--	--	--	96.1	4.86	99.1	96.0	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
2,4,5-Trichlorophenol	360 - ####	0 / 14	--	--	--	291	145	359	262	1,350	-- / --	0.81	NO	--	--	NO	--	-- / --	--	NO
2,4,6-Trichlorophenol	360 - 450	0 / 14	--	--	--	191	12.1	196	190	580	-- / --	0.78	NO	--	--	NO	--	-- / --	--	NO
2,4-Dichlorophenol	360 - 450	0 / 14	--	--	--	191	12.1	196	190	500	-- / --	0.90	NO	--	--	NO	--	-- / --	--	NO
2,4-Dimethylphenol	360 - 450	0 / 14	--	--	--	191	12.1	196	190	1,000	-- / --	0.45	NO	--	--	NO	--	-- / --	--	NO
2,4-Dinitrophenol	360 - ####	0 / 14	--	--	--	290	144	359	261	20,000	-- / --	0.06	NO	--	--	NO	--	-- / --	--	NO
2,4-Dinitrotoluene	0.26 - ####	1 / 14	430	430	A06SB05-01	541	304	685	267	11,000	0 / 14	0.04	NO	--	--	NO	--	-- / --	--	NO
2,6-Dinitrotoluene	0.25 - ####	1 / 14	500	500	A06SB05-01	1,027	667	1,343	416	8,500	0 / 14	0.06	NO	--	--	NO	--	-- / --	--	NO
2-Chloronaphthalene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
2-Chlorophenol	360 - 450	0 / 14	--	--	--	191	12.1	196	190	500	-- / --	0.90	NO	--	--	NO	--	-- / --	--	NO
2-Methylnaphthalene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
2-Methylphenol	360 - 450	0 / 14	--	--	--	191	12.1	196	190	1,000	-- / --	0.45	NO	--	--	NO	--	-- / --	--	NO
2-Nitroaniline	180 - ####	0 / 14	--	--	--	231	190	321	170	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
2-Nitrophenol	360 - 450	0 / 14	--	--	--	191	12.1	196	190	1,000	-- / --	0.45	NO	--	--	NO	--	-- / --	--	NO
3,3'-Dichlorobenzidine	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
3-Nitroaniline	360 - ####	0 / 14	--	--	--	291	145	359	262	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4,6-Dinitro-2-methylphenol	360 - ####	0 / 14	--	--	--	291	145	359	262	1,000	-- / --	1.10	**YES**	0.36	0.29	NO	--	-- / --	--	NO
4-Bromophenyl-phenylether	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Chloro-3-methylphenol	360 - 450	0 / 14	--	--	--	191	12.1	196	190	500	-- / --	0.90	NO	--	--	NO	--	-- / --	--	NO
4-Chloroaniline	360 - 450	0 / 14	--	--	--	191	12.1	196	190	500	-- / --	0.90	NO	--	--	NO	--	-- / --	--	NO
4-Chlorophenyl-phenylether	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Methylphenol	270 - 450	0 / 14	--	--	--	161	28.4	174	159	1,000	-- / --	0.45	NO	--	--	NO	--	-- / --	--	NO
4-Nitroaniline	360 - ####	0 / 14	--	--	--	291	145	359	262	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Nitrophenol	360 - ####	0 / 14	--	--	--	291	145	359	262	380	-- / --	2.89	**YES**	0.95	0.77	NO	--	-- / --	--	NO
Acenaphthene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Acenaphthylene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Acetophenone	180 - 210	0 / 9	--	--	--	96.1	4.86	99.1	96.0	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Anthracene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Atrazine	180 - 210	0 / 9	--	--	--	96.1	4.86	99.1	96.0	11.9	-- / --	17.6	**YES**	8.33	8.08	NO[4]	--	-- / --	--	NO[4]
Benzaldehyde	180 - 210	0 / 9	--	--	--	96.1	4.86	99.1	96.0	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Benzo(a)anthracene	180 - 450	2 / 14	36.0	39.0	YS24-SB05-0_5-2-0410	123	60.2	151	108	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Benzo(a)pyrene	180 - 450	2 / 14	44.0	180	YS24-SB04-0_5-2-0410	134	55.7	160	122	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO

TABLE 7-21

Screening Statistics - Site 24 Subsurface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance [1]	m Hazard Quotient [2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
Benzo(b)fluoranthene	180 - 450	2 / 14	64.0	300	YS24-SB04-0_5-2-0410	144	68.7	176	130	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Benzo(g,h,i)perylene	180 - 450	2 / 14	41.0	130	YS24-SB04-0_5-2-0410	130	54.5	156	119	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Benzo(k)fluoranthene	180 - 450	2 / 14	65.0	260	YS24-SB04-0_5-2-0410	141	62.1	170	129	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
bis(2-Chloroethoxy)methane	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
bis(2-Chloroethyl)ether	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
bis(2-Chloroisopropyl)ether	370 - 450	0 / 5	--	--	--	195	17.0	211	194	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
bis(2-Ethylhexyl)phthalate	180 - 380	5 / 14	55.0	470	A06SB05-01	132	107	183	110	30,000	0 / 14	0.02	NO	--	--	NO	--	-- / --	--	NO
Butylbenzylphthalate	180 - 450	0 / 14	--	--	--	131	50.2	155	124	30,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Caprolactam	180 - 210	0 / 9	--	--	--	96.1	4.86	99.1	96.0	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Carbazole	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Chrysene	180 - 450	2 / 14	68.0	110	YS24-SB04-0_5-2-0410	130	51.8	155	121	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Dibenz(a,h)anthracene	180 - 450	1 / 14	45.0	45.0	YS24-SB04-0_5-2-0410	128	54.8	153	117	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Dibenzofuran	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Diethylphthalate	180 - 450	0 / 14	--	--	--	131	50.2	155	124	26,800	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Dimethyl phthalate	180 - 450	0 / 14	--	--	--	131	50.2	155	124	10,640	-- / --	0.04	NO	--	--	NO	--	-- / --	--	NO
Di-n-butylphthalate	180 - 210	5 / 14	45.0	400	A06SB06-01	126	106	176	102	40,000	0 / 14	0.01	NO	--	--	NO	--	-- / --	--	NO
Di-n-octylphthalate	180 - 450	0 / 14	--	--	--	131	50.2	155	124	30,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
Fluoranthene	180 - 450	4 / 14	25.0	90.0	YS24-SB05-0_5-2-0410	119	63.8	149	100	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Fluorene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Hexachlorobenzene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	1,000	-- / --	0.45	NO	--	--	NO	--	-- / --	--	NO
Hexachlorobutadiene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Hexachlorocyclopentadiene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	2,000	-- / --	0.23	NO	--	--	NO	--	-- / --	--	NO
Hexachloroethane	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Indeno(1,2,3-cd)pyrene	180 - 450	1 / 14	150	150	YS24-SB04-0_5-2-0410	135	49.6	158	127	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Isophorone	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Naphthalene	180 - 450	0 / 14	--	--	--	131	50.2	155	124	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
n-Nitroso-di-n-propylamine	180 - 450	0 / 14	--	--	--	131	50.2	155	124	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
n-Nitrosodiphenylamine	180 - 450	0 / 14	--	--	--	131	50.2	155	124	1,090	-- / --	0.41	NO	--	--	NO	--	-- / --	--	NO
Nitrobenzene	0.26 - ####	0 / 14	--	--	--	519	323	672	245	2,260	-- / --	0.66	NO	--	--	NO	--	-- / --	--	NO
PAH (LMW)	810 - ####	4 / 14	754	862	YS24-SB04-0_5-2-0410	698	214	799	664	29,000	0 / 14	0.03	NO	--	--	NO	--	-- / --	--	NO
PAH (HMW)	810 - ####	3 / 14	592	1,331	YS24-SB04-0_5-2-0410	691	280	823	643	18,000	0 / 14	0.07	NO	--	--	NO	--	-- / --	--	NO
Pentachlorophenol	360 - ####	0 / 14	--	--	--	291	145	359	262	5,000	-- / --	0.22	NO	--	--	NO	--	-- / --	--	NO
Phenanthrene	180 - 450	1 / 14	25.0	25.0	YS24-SB05-0_5-2-0410	126	57.1	153	112	LPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Phenol	360 - 450	0 / 14	--	--	--	191	12.1	196	190	1,880	-- / --	0.24	NO	--	--	NO	--	-- / --	--	NO
Pyrene	180 - 450	3 / 14	34.0	120	YS24-SB04-0_5-2-0410	128	56.0	154	115	HPAH	-- / --	--	NO	--	--	NO	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																				
1,1,1-Trichloroethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	1,025	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
1,1,2,2-Tetrachloroethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	5,000	-- / --	0.003	NO	--	--	NO	--	-- / --	--	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-11	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
1,1,2-Trichloroethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	2,000	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
1,1-Dichloroethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	548	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
1,1-Dichloroethene	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	173	-- / --	0.08	NO	--	--	NO	--	-- / --	--	NO
1,2,4-Trichlorobenzene	3.40 - 450	0 / 14	--	--	--	71.0	96.4	117	10.5	1,270	-- / --	0.35	NO	--	--	NO	--	-- / --	--	NO
1,2-Dibromo-3-chloropropane	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
1,2-Dibromoethane	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	300	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO

TABLE 7-21

Screening Statistics - Site 24 Subsurface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance [1]	m Hazard Quotient [2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
1,2-Dichlorobenzene	3.40 - 450	0 / 14	--	--	--	71.0	96.4	117	10.5	1,000	-- / --	0.45	NO	--	--	NO	--	-- / --	--	NO
1,2-Dichloroethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	2,190	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
1,2-Dichloroethene (total)	11.0 - 12.0	0 / 3	--	--	--	5.83	0.29	6.32	5.83	447	-- / --	0.03	NO	--	--	NO	--	-- / --	--	NO
1,2-Dichloropropane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	38,800	-- / --	0.0003	NO	--	--	NO	--	-- / --	--	NO
1,3-Dichlorobenzene	3.40 - 450	0 / 14	--	--	--	71.0	96.4	117	10.5	1,000	-- / --	0.45	NO	--	--	NO	--	-- / --	--	NO
1,4-Dichlorobenzene	3.40 - 450	0 / 14	--	--	--	59.4	90.5	102	9.10	1,280	-- / --	0.35	NO	--	--	NO	--	-- / --	--	NO
2-Butanone	2.70 - 14.0	4 / 14	5.60	88.0	A06SB03-01	10.9	22.3	21.5	5.29	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
2-Hexanone	8.50 - 15.0	0 / 14	--	--	--	5.54	1.11	6.06	5.43	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Methyl-2-pentanone	8.50 - 15.0	0 / 14	--	--	--	5.54	1.11	6.06	5.43	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Acetone	9.40 - 54.0	0 / 14	--	--	--	12.3	7.19	15.7	10.4	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Benzene	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	1,140	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Bromodichloromethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Bromoform	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	300	-- / --	0.04	NO	--	--	NO	--	-- / --	--	NO
Bromomethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Carbon disulfide	3.50 - 13.0	2 / 14	1.90	2.80	YS24-SB06-0_5-2-0410	3.54	1.96	4.46	3.06	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Carbon tetrachloride	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	3,400	-- / --	0.004	NO	--	--	NO	--	-- / --	--	NO
Chlorobenzene	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	2,400	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Chloroethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	5,000	-- / --	0.003	NO	--	--	NO	--	-- / --	--	NO
Chloroform	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	1,844	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Chloromethane	3.40 - 13.0	1 / 14	0.66	0.66	YS24-SB02-0_5-2-0410	3.33	2.13	4.34	2.70	5,000	0 / 14	0.0001	NO	--	--	NO	--	-- / --	--	NO
cis-1,2-Dichloroethene	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	447	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
cis-1,3-Dichloropropene	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	5,000	-- / --	0.003	NO	--	--	NO	--	-- / --	--	NO
Cyclohexane	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	6,000	-- / --	0.001	NO	--	--	NO	--	-- / --	--	NO
Dibromochloromethane	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Dichlorodifluoromethane (Freon-12)	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Ethylbenzene	3.40 - 13.0	3 / 14	1.10	3.10	YS24-SB08-0_5-2-0410	3.49	2.03	4.45	2.96	1,815	0 / 14	0.002	NO	--	--	NO	--	-- / --	--	NO
Isopropylbenzene	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
m- and p-Xylene	0.25 - 12.0	0 / 9	--	--	--	3.65	1.64	4.67	2.72	1,300	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Methyl acetate	3.60 - 5.60	3 / 9	14.0	680	YS24-SB02-0_5-2-0410	82.4	224	221	6.62	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Methylcyclohexane	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Methylene chloride	0.36 - 13.0	2 / 14	3.00	8.00	A06SB10-01	2.35	2.61	3.58	1.14	1,250	0 / 14	0.01	NO	--	--	NO	--	-- / --	--	NO
Methyl-tert-butyl ether (MTBE)	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
o-Xylene	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	1,300	-- / --	0.005	NO	--	--	NO	--	-- / --	--	NO
Styrene	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	64,000	-- / --	0.0002	NO	--	--	NO	--	-- / --	--	NO
Tetrachloroethene	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	179	-- / --	0.07	NO	--	--	NO	--	-- / --	--	NO
Toluene	0.29 - 13.0	0 / 14	--	--	--	2.92	2.51	4.11	1.65	40,000	-- / --	0.0003	NO	--	--	NO	--	-- / --	--	NO
trans-1,2-Dichloroethene	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	447	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
trans-1,3-Dichloropropene	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	5,000	-- / --	0.003	NO	--	--	NO	--	-- / --	--	NO
Trichloroethene	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	500	-- / --	0.03	NO	--	--	NO	--	-- / --	--	NO
Trichlorofluoromethane (Freon-11)	3.40 - 6.10	0 / 9	--	--	--	2.11	0.52	2.44	2.06	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Vinyl chloride	3.40 - 13.0	0 / 14	--	--	--	3.50	1.99	4.44	3.02	412	-- / --	0.03	NO	--	--	NO	--	-- / --	--	NO
Xylene, total	0.24 - 13.0	0 / 14	--	--	--	3.33	2.17	4.36	2.43	1,300	-- / --	0.01	NO	--	--	NO	--	-- / --	--	NO
Explosives (UG/KG)																				
1,3,5-Trinitrobenzene	0.25 - ####	1 / 14	660	660	A06SB05-01	556	306	701	272	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
1,3-Dinitrobenzene	0.25 - ####	0 / 14	--	--	--	518	325	672	241	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO

TABLE 7-21

Screening Statistics - Site 24 Subsurface Soil

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance [1]	m Hazard Quotient [2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
2,4,6-Trinitrotoluene	0.25 - ####	1 / 14	1,200	1,200	A06SB05-01	595	351	761	284	10,000	0 / 14	0.12	NO	--	--	NO	--	-- / --	--	NO
2-Amino-4,6-dinitrotoluene	#### - ####	0 / 9	--	--	--	750	0.0	750	750	80,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
2-Nitrotoluene	0.25 - ####	0 / 14	--	--	--	1,000	697	1,330	377	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
3-Nitrotoluene	0.22 - ####	0 / 14	--	--	--	996	703	1,328	360	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
4-Amino-2,6-dinitrotoluene	0.25 - ####	0 / 14	--	--	--	518	325	672	241	80,000	-- / --	0.02	NO	--	--	NO	--	-- / --	--	NO
4-Nitrotoluene	#### - ####	0 / 9	--	--	--	1,500	0.0	1,500	1,500	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
HMX	0.50 - ####	0 / 14	--	--	--	554	280	686	309	10,000	-- / --	0.15	NO	--	--	NO	--	-- / --	--	NO
RDX	0.50 - ####	0 / 14	--	--	--	554	280	686	309	10,000	-- / --	0.15	NO	--	--	NO	--	-- / --	--	NO
Tetryl	0.65 - ####	0 / 13	--	--	--	1,023	633	1,336	490	10,000	-- / --	0.30	NO	--	--	NO	--	-- / --	--	NO
Other Parameters																				
pH	-- - --	14 / 14	4.61	8.35	YS24-SB08-0_5-2-0410	6.47	1.28	7.08	6.35	--	-- / --	--	--	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	9 / 9	2,771	12,140	YS24-SB09-0_5-2-0410	7,081	2,860	8,854	6,503	--	-- / --	--	--	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - Macronutrient - Not considered to be a COPC

4 - See uncertainty section

5 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-22

Screening Statistics - Site 24 Subsurface Soil - Samples From Outside of Estimated Waste Boundary

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance [1]	m Hazard Quotient [2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance [4]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																				
Aluminum	-- - --	13 / 13	2,670	7,930	YS24-SB03-0_5-2-0410	5,607	1,456	6,327	5,408	pH < 5.5	1 / 13	--	**YES**	mean pH in range		NO	12,200	0 / 13	0.65	NO
Arsenic	1.10 - 1.10	11 / 13	0.63	113	YS24-SB04-0_5-2-0410	10.3	30.9	25.6	1.86	18.0	1 / 13	6.28	**YES**	1.42	0.57	**YES**	5.54	1 / 13	20.4	**YES**
Iron	-- - --	13 / 13	1,720	14,700	YS24-SB06-0_5-2-0410	6,319	4,066	8,329	5,268	5 < pH > 8	3 / 13	--	**YES**	mean pH in range		NO	19,900	0 / 13	0.74	NO
Mercury	#### - 0.11	6 / 13	0.018	0.56	A06SB05-01	0.074	0.15	0.15	0.037	0.10	1 / 13	5.60	**YES**	1.47	0.74	**YES**	0.14	1 / 13	4.00	**YES**
Selenium	0.53 - 0.70	0 / 13	--	--	--	0.29	0.022	0.30	0.29	0.52	-- / --	1.35	**YES**	0.58	0.56	NO	--	-- / --	--	NO
Thallium	0.88 - 1.20	0 / 13	--	--	--	0.53	0.060	0.56	0.53	1.00	-- / --	1.20	**YES**	0.56	0.53	NO	--	-- / --	--	NO
Pesticides (UG/KG)																				
Endrin ketone	3.60 - 4.10	0 / 12	--	--	--	1.89	0.071	1.92	1.89	1.95	-- / --	2.10	**YES**	0.99	0.97	NO	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																				
4,6-Dinitro-2-methylphenol	360 - ####	0 / 13	--	--	--	299	147	372	269	1,000	-- / --	1.10	**YES**	0.37	0.30	NO	--	-- / --	--	NO
4-Nitrophenol	360 - ####	0 / 13	--	--	--	299	147	372	269	380	-- / --	2.89	**YES**	0.98	0.79	NO	--	-- / --	--	NO
Atrazine	180 - 210	0 / 8	--	--	--	96.9	4.58	99.9	96.8	11.9	-- / --	17.6	**YES**	8.40	8.14	NO [3]	--	-- / --	--	NO [3]
Volatile Organic Compounds (UG/KG)																				
2-Butanone	2.70 - 14.0	4 / 13	5.60	88.0	A06SB03-01	11.4	23.1	22.9	5.35	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Carbon disulfide	3.50 - 13.0	2 / 13	1.90	2.80	YS24-SB06-0_5-2-0410	3.67	1.98	4.65	3.19	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Methyl acetate	3.60 - 5.60	3 / 8	14.0	680	YS24-SB02-0_5-2-0410	92.5	238	252	7.79	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**
Explosives (UG/KG)																				
1,3,5-Trinitrobenzene	0.25 - ####	1 / 13	660	660	A06SB05-01	541	313	696	252	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - See uncertainty section
4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-23

Screening Statistics - Site 24 Subsurface Soil - Samples From the Sludge Area

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance [1]	m Hazard Quotient [2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																				
Aluminum	-- - --	1 / 1	3,640	3,640	YS24-SB09-0_5-2-0410	3,640	--	--	3,640	pH < 5.5	1 / 1	--	**YES**	mean pH < 5.5		**YES**	12,200	0 / 1	0.30	NO
Arsenic	2.30 - 2.30	0 / 1	--	--	--	1.15	--	--	1.15	18.0	-- / --	0.13	NO	--	--	NO	--	-- / --	--	NO
Iron	-- - --	1 / 1	5,820	5,820	YS24-SB09-0_5-2-0410	5,820	--	--	5,820	5 < pH > 8	1 / 1	--	**YES**	mean pH < 5		**YES**	19,900	0 / 1	0.29	NO
Mercury	#### - ####	0 / 1	--	--	--	0.013	--	--	0.013	0.10	-- / --	0.25	NO	--	--	NO	--	-- / --	--	NO
Selenium	0.53 - 0.53	0 / 1	--	--	--	0.27	--	--	0.27	0.52	-- / --	1.02	**YES**	--	0.51	NO	--	-- / --	--	NO
Thallium	1.10 - 1.10	0 / 1	--	--	--	0.55	--	--	0.55	1.00	-- / --	1.10	**YES**	--	0.55	NO	--	-- / --	--	NO
Pesticides (UG/KG)																				
Endrin ketone	3.60 - 3.60	0 / 1	--	--	--	1.80	--	--	1.80	1.95	-- / --	1.85	**YES**	--	0.92	NO	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																				
4,6-Dinitro-2-methylphenol	360 - 360	0 / 1	--	--	--	180	--	--	180	1,000	-- / --	0.36	NO	--	0.18	NO	--	-- / --	--	NO
4-Nitrophenol	360 - 360	0 / 1	--	--	--	180	--	--	180	380	-- / --	0.95	NO	--	0.47	NO	--	-- / --	--	NO
Atrazine	180 - 180	0 / 1	--	--	--	90.0	--	--	90.0	11.9	-- / --	15.1	**YES**	--	7.56	NO[3]	--	-- / --	--	NO[3]
Volatile Organic Compounds (UG/KG)																				
2-Butanone	9.00 - 9.00	0 / 1	--	--	--	4.50	--	--	4.50	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Carbon disulfide	3.60 - 3.60	0 / 1	--	--	--	1.80	--	--	1.80	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Methyl acetate	3.60 - 3.60	0 / 1	--	--	--	1.80	--	--	1.80	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO
Explosives (UG/KG)																				
1,3,5-Trinitrobenzene	#### - ####	0 / 1	--	--	--	750	--	--	750	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - See uncertainty section
4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-24

Screening Statistics - Site 24 Groundwater

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Inorganics (UG/L)													
Aluminum	37.9 - 234	0 / 10	--	--	--	42.5	29.3	59.5	36.7	87.0	-- / --	2.69	**YES**
Antimony	5.30 - 8.20	0 / 10	--	--	--	3.51	0.42	3.76	3.49	500	-- / --	0.02	NO
Arsenic	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	36.0	-- / --	0.28	NO
Barium	200 - 200	8 / 10	15.6	35.1	YS24-GW01D-0610	37.5	33.5	56.9	28.8	200	0 / 10	0.18	NO
Beryllium	0.81 - 5.00	0 / 10	--	--	--	1.67	1.08	2.29	1.22	100	-- / --	0.05	NO
Cadmium	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	8.85	-- / --	0.56	NO
Calcium [3]	-- - --	10 / 10	25,300	126,000	YS24-GW03S-0610	96,350	29,240	113,300	89,552	NSV	-- / --	NSV	NO
Chromium	0.82 - 10.0	0 / 10	--	--	--	4.10	1.91	5.20	3.12	50.4	-- / --	0.20	NO
Cobalt	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	23.0	-- / --	0.22	NO
Copper	1.20 - 5.00	0 / 10	--	--	--	1.91	0.89	2.42	1.62	3.73	-- / --	1.34	**YES**
Cyanide	10.0 - 10.0	2 / 10	4.50	5.40	YS24-GW05S-0610	4.99	0.21	5.11	4.99	1.00	2 / 10	5.40	**YES**
Iron	50.3 - 100	4 / 10	16.8	541	YS24-GW01D-0610	125	163	219	70.5	1,000	0 / 10	0.54	NO
Lead	1.60 - 3.00	0 / 10	--	--	--	1.33	0.29	1.49	1.29	8.52	-- / --	0.35	NO
Magnesium [3]	-- - --	10 / 10	1,500	4,000	YS24-GW05S-0610	2,386	732	2,810	2,291	NSV	-- / --	NSV	NO
Manganese	1.40 - 13.6	5 / 10	4.90	113	YS24-GW01D-0610	19.3	34.1	39.1	6.28	100	1 / 10	1.13	**YES**
Mercury	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	1.11	-- / --	0.18	NO
Nickel	0.78 - 5.00	0 / 10	--	--	--	1.52	1.04	2.12	1.15	8.28	-- / --	0.60	NO
Potassium [3]	5,000 - ####	8 / 10	286	27,600	YS24-GW02D-0610	4,825	8,477	9,739	1,832	NSV	-- / --	NSV	NO
Selenium	2.40 - 5.00	0 / 10	--	--	--	2.17	0.54	2.48	2.09	71.1	-- / --	0.07	NO
Silver	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	0.23	-- / --	21.7	**YES**
Sodium [3]	3,580 - ####	7 / 10	3,650	90,100	YS24-GW02D-0610	15,959	28,122	32,260	6,248	NSV	-- / --	NSV	NO
Thallium	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	21.3	-- / --	0.47	NO
Vanadium	20.0 - 20.0	1 / 10	4.50	4.50	YS24-GW02D-0610	9.45	1.74	10.5	9.23	50.0	0 / 10	0.09	NO
Zinc	20.0 - 20.0	1 / 10	4.30	4.30	YS24-GW02D-0610	9.43	1.80	10.5	9.19	85.6	0 / 10	0.05	NO
Dissolved Metals (UG/L)													
Aluminum	42.8 - 96.8	0 / 10	--	--	--	34.1	7.84	38.7	33.3	87.0	-- / --	1.11	**YES**
Antimony	4.70 - 10.3	0 / 10	--	--	--	3.51	0.88	4.02	3.42	500	-- / --	0.02	NO
Arsenic	3.60 - 10.0	0 / 10	--	--	--	4.47	1.15	5.13	4.27	36.0	-- / --	0.28	NO
Barium	200 - 200	8 / 10	16.2	33.1	YS24-GW01D-0610	37.0	33.5	56.4	28.4	200	0 / 10	0.17	NO
Beryllium	5.00 - 5.00	5 / 10	0.88	1.50	YS24-GW05S-0610	1.79	0.77	2.24	1.62	100	0 / 10	0.02	NO
Cadmium	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	8.80	-- / --	0.57	NO
Calcium[3]	-- - --	10 / 10	16,100	123,000	YS24-GW03S-0610	95,010	31,154	113,069	85,347	NSV	-- / --	NSV	NO
Chromium	0.85 - 10.0	0 / 10	--	--	--	3.23	2.28	4.56	2.09	50.0	-- / --	0.20	NO
Cobalt	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	23.0	-- / --	0.22	NO

TABLE 7-24

Screening Statistics - Site 24 Groundwater

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Copper	5.00 - 5.00	3 / 10	2.90	4.20	YS24-GW03S-0610	2.77	0.55	3.09	2.73	3.10	2 / 10	1.35	**YES**
Iron	22.5 - 100	1 / 10	116	116	YS24-GW08S-0610	49.1	27.0	64.7	42.7	1,000	0 / 10	0.12	NO
Lead	1.70 - 3.00	0 / 10	--	--	--	1.17	0.26	1.32	1.14	8.10	-- / --	0.37	NO
Magnesium[3]	-- - --	10 / 10	1,570	4,210	YS24-GW05S-0610	2,502	764	2,945	2,405	NSV	-- / --	NSV	NO
Manganese	1.40 - 3.80	6 / 10	5.50	110	YS24-GW01D-0610	18.6	33.3	37.9	5.84	100	1 / 10	1.10	**YES**
Mercury	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	0.94	-- / --	0.21	NO
Nickel	0.71 - 5.00	0 / 10	--	--	--	2.08	0.88	2.59	1.74	8.20	-- / --	0.61	NO
Potassium[3]	128 - ####	2 / 10	7,990	27,600	YS24-GW02D-0610	4,143	8,580	9,116	906	NSV	-- / --	NSV	NO
Selenium	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	71.0	-- / --	0.07	NO
Silver	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	0.23	-- / --	21.7	**YES**
Sodium[3]	-- - --	10 / 10	3,960	93,900	YS24-GW02D-0610	17,171	28,560	33,727	8,370	NSV	-- / --	NSV	NO
Thallium	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	21.3	-- / --	0.47	NO
Vanadium	20.0 - 20.0	2 / 10	1.70	4.10	YS24-GW02D-0610	8.58	3.05	10.3	7.66	50.0	0 / 10	0.08	NO
Zinc	4.90 - 20.0	0 / 10	--	--	--	5.26	3.23	7.13	4.46	81.0	-- / --	0.25	NO
Pesticides (UG/L)													
4,4'-DDD	0.10 - 0.10	0 / 10	--	--	--	0.050	7.31E-18	0.050	0.050	0.025	-- / --	4.00	**YES**
4,4'-DDE	0.10 - 0.10	0 / 10	--	--	--	0.050	7.31E-18	0.050	0.050	0.14	-- / --	0.71	NO
4,4'-DDT	0.10 - 0.10	0 / 10	--	--	--	0.050	7.31E-18	0.050	0.050	0.0065	-- / --	15.4	**YES**
Aldrin	0.050 - ####	0 / 10	--	--	--	0.025	3.66E-18	0.025	0.025	0.13	-- / --	0.38	NO
alpha-BHC	0.050 - ####	0 / 10	--	--	--	0.025	3.66E-18	0.025	0.025	25.0	-- / --	0.002	NO
alpha-Chlordane	0.050 - ####	0 / 10	--	--	--	0.025	3.66E-18	0.025	0.025	0.0040	-- / --	12.5	**YES**
beta-BHC	0.018 - ####	1 / 10	0.018	0.018	YS24-GW02D-0610	0.019	0.0066	0.022	0.017	25.0	0 / 10	0.001	NO
delta-BHC	##### - ####	0 / 10	--	--	--	0.016	0.010	0.022	0.012	25.0	-- / --	0.002	NO
Dieldrin	0.10 - 0.10	2 / 10	0.0038	0.0041	YS24-GW10S-0610	0.041	0.019	0.052	0.030	0.11	0 / 10	0.04	NO
Endosulfan I	0.050 - ####	3 / 10	0.0056	0.084	YS24-GW02D-0610	0.029	0.020	0.041	0.024	0.0087	2 / 10	9.66	**YES**
Endosulfan II	0.10 - 0.10	1 / 10	0.0046	0.0046	YS24-GW10S-0610	0.045	0.014	0.054	0.039	0.0087	0 / 10	0.53	NO
Endosulfan sulfate	0.10 - 0.10	0 / 10	--	--	--	0.050	7.31E-18	0.050	0.050	0.0087	-- / --	11.5	**YES**
Endrin	0.10 - 0.10	2 / 10	0.0057	0.0066	YS24-GW10S-0610	0.041	0.018	0.052	0.033	0.010	0 / 10	0.66	NO
Endrin aldehyde	##### - 0.10	0 / 10	--	--	--	0.025	0.022	0.038	0.015	0.010	-- / --	10.0	**YES**
Endrin ketone	0.10 - 0.10	0 / 10	--	--	--	0.050	7.31E-18	0.050	0.050	0.010	-- / --	10.0	**YES**
gamma-BHC (Lindane)	0.050 - ####	0 / 10	--	--	--	0.025	3.66E-18	0.025	0.025	0.016	-- / --	3.13	**YES**
gamma-Chlordane	0.050 - ####	1 / 10	0.0061	0.0061	YS24-GW06S-0610	0.023	0.0060	0.027	0.022	0.0040	1 / 10	1.53	**YES**
Heptachlor	0.050 - ####	0 / 10	--	--	--	0.025	3.66E-18	0.025	0.025	0.0036	-- / --	13.9	**YES**
Heptachlor epoxide	0.050 - ####	4 / 10	0.0060	0.028	YS24-GW04S-0610	0.020	0.0088	0.025	0.017	0.0036	4 / 10	7.78	**YES**
Methoxychlor	0.50 - 0.50	1 / 10	0.036	0.036	YS24-GW06S-0610	0.23	0.068	0.27	0.21	0.030	1 / 10	1.20	**YES**
Toxaphene	2.50 - 2.50	0 / 10	--	--	--	1.25	0.0	1.25	1.25	0.21	-- / --	11.9	**YES**

TABLE 7-24

Screening Statistics - Site 24 Groundwater

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Polychlorinated Biphenyls (UG/L)													
Aroclor-1016	0.93 - 0.93	0 / 10	--	--	--	0.47	5.85E-17	0.47	0.47	0.030	-- / --	31.0	**YES**
Aroclor-1221	1.30 - 1.30	0 / 10	--	--	--	0.65	1.17E-16	0.65	0.65	0.030	-- / --	43.3	**YES**
Aroclor-1232	0.93 - 0.93	0 / 10	--	--	--	0.47	5.85E-17	0.47	0.47	0.030	-- / --	31.0	**YES**
Aroclor-1242	0.63 - 0.63	0 / 10	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**
Aroclor-1248	0.63 - 0.63	0 / 10	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**
Aroclor-1254	0.63 - 0.63	0 / 10	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**
Aroclor-1260	0.93 - 0.93	0 / 10	--	--	--	0.47	5.85E-17	0.47	0.47	0.030	-- / --	31.0	**YES**
Semivolatile Organic Compounds (UG/L)													
1,1-Biphenyl	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	14.0	-- / --	0.36	NO
2,2'-Oxybis(1-chloropropane)	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	NSV	-- / --	NSV	NO
2,4,5-Trichlorophenol	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	12.0	-- / --	0.42	NO
2,4,6-Trichlorophenol	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	61.0	-- / --	0.08	NO
2,4-Dichlorophenol	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	11.0	-- / --	0.45	NO
2,4-Dimethylphenol	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	100	-- / --	0.05	NO
2,4-Dinitrophenol	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	48.5	-- / --	0.21	NO
2,4-Dinitrotoluene	2.50 - 2.50	0 / 10	--	--	--	1.25	0.0	1.25	1.25	480	-- / --	0.01	NO
2,6-Dinitrotoluene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	1,000	-- / --	0.01	NO
2-Chloronaphthalene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	0.40	-- / --	12.5	**YES**
2-Chlorophenol	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	265	-- / --	0.04	NO
2-Methylnaphthalene	0.20 - 5.00	1 / 10	0.017	0.017	YS24-GW02D-0610	0.33	0.76	0.77	0.12	330	0 / 10	0.0001	NO
2-Methylphenol	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	1,020	-- / --	0.005	NO
2-Nitroaniline	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	NSV	-- / --	NSV	NO
2-Nitrophenol	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	2,940	-- / --	0.002	NO
3,3'-Dichlorobenzidine	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	73.0	-- / --	0.07	NO
3-Nitroaniline	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	NSV	-- / --	NSV	NO
4,6-Dinitro-2-methylphenol	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	2.30	-- / --	4.35	**YES**
4-Bromophenyl-phenylether	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	1.50	-- / --	3.33	**YES**
4-Chloro-3-methylphenol	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	0.30	-- / --	16.7	**YES**
4-Chloroaniline	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	232	-- / --	0.02	NO
4-Chlorophenyl-phenylether	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	NSV	-- / --	NSV	NO
4-Methylphenol	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	543	-- / --	0.02	NO
4-Nitroaniline	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	NSV	-- / --	NSV	NO
4-Nitrophenol	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	71.7	-- / --	0.14	NO
Acenaphthene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	40.0	-- / --	0.01	NO
Acenaphthylene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	4,840	-- / --	0.00004	NO

TABLE 7-24

Screening Statistics - Site 24 Groundwater

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Acetophenone	1.20 - 5.00	0 / 10	--	--	--	2.31	0.60	2.66	2.17	NSV	-- / --	NSV	NO
Anthracene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	0.18	-- / --	1.11	**YES**
Atrazine	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	10.0	-- / --	0.50	NO
Benzaldehyde	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	NSV	-- / --	NSV	NO
Benzo(a)anthracene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	0.027	-- / --	7.41	**YES**
Benzo(a)pyrene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	0.014	-- / --	14.3	**YES**
Benzo(b)fluoranthene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	9.07	-- / --	0.02	NO
Benzo(g,h,i)perylene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	7.64	-- / --	0.65	NO
Benzo(k)fluoranthene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	9.07	-- / --	0.02	NO
bis(2-Chloroethoxy)methane	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	NSV	-- / --	NSV	NO
bis(2-Chloroethyl)ether	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	1,900	-- / --	0.003	NO
bis(2-Ethylhexyl)phthalate	5.00 - 34.0	1 / 10	1.60	1.60	YS24-GW02D-0610	3.86	4.63	6.54	2.90	360	0 / 10	0.004	NO
Butylbenzylphthalate	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	29.4	-- / --	0.17	NO
Caprolactam	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	NSV	-- / --	NSV	NO
Carbazole	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	NSV	-- / --	NSV	NO
Chrysene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	NSV	-- / --	NSV	NO
Dibenz(a,h)anthracene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	NSV	-- / --	NSV	NO
Dibenzofuran	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	65.0	-- / --	0.08	NO
Diethylphthalate	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	75.9	-- / --	0.07	NO
Dimethyl phthalate	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	580	-- / --	0.01	NO
Di-n-butylphthalate	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	3.40	-- / --	1.47	**YES**
Di-n-octylphthalate	5.00 - 5.00	1 / 10	7.10	7.10	YS24-GW01D-0610	2.96	1.45	3.80	2.78	22.0	0 / 10	0.32	NO
Fluoranthene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	11.0	-- / --	0.02	NO
Fluorene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	3.90	-- / --	0.05	NO
Hexachlorobenzene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	3.68	-- / --	1.36	**YES**
Hexachlorobutadiene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	0.32	-- / --	15.6	**YES**
Hexachlorocyclopentadiene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	0.070	-- / --	71.4	**YES**
Hexachloroethane	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	9.40	-- / --	0.53	NO
Indeno(1,2,3-cd)pyrene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	4.31	-- / --	1.16	**YES**
Isophorone	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	129	-- / --	0.04	NO
Naphthalene	0.20 - 5.00	0 / 10	--	--	--	0.82	1.16	1.49	0.26	23.5	-- / --	0.21	NO
n-Nitroso-di-n-propylamine	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	120	-- / --	0.04	NO
n-Nitrosodiphenylamine	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	33,000	-- / --	0.0002	NO
Nitrobenzene	2.50 - 2.50	0 / 10	--	--	--	1.25	0.0	1.25	1.25	66.8	-- / --	0.04	NO
Pentachlorophenol	10.0 - 10.0	0 / 10	--	--	--	5.00	0.0	5.00	5.00	7.90	-- / --	1.27	**YES**
Phenanthrene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	8.30	-- / --	0.02	NO
Phenol	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	58.0	-- / --	0.09	NO
Pyrene	0.20 - 0.20	0 / 10	--	--	--	0.100	1.46E-17	0.10	0.100	0.24	-- / --	0.83	NO

TABLE 7-24

Screening Statistics - Site 24 Groundwater

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Volatile Organic Compounds (UG/L)													
1,1,1-Trichloroethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	312	-- / --	0.002	NO
1,1,2,2-Tetrachloroethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	90.2	-- / --	0.01	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-11	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
1,1,2-Trichloroethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	550	-- / --	0.001	NO
1,1-Dichloroethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	47.0	-- / --	0.01	NO
1,1-Dichloroethene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	2,240	-- / --	0.0002	NO
1,2,4-Trichlorobenzene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	5.40	-- / --	0.09	NO
1,2-Dibromo-3-chloropropane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
1,2-Dibromoethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
1,2-Dichlorobenzene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	42.0	-- / --	0.01	NO
1,2-Dichloroethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	1,130	-- / --	0.0004	NO
1,2-Dichloropropane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	2,400	-- / --	0.0002	NO
1,3-Dichlorobenzene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	28.5	-- / --	0.02	NO
1,4-Dichlorobenzene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	19.9	-- / --	0.03	NO
2-Hexanone	2.50 - 2.50	0 / 10	--	--	--	1.25	0.0	1.25	1.25	99.0	-- / --	0.03	NO
4-Methyl-2-pentanone	2.50 - 2.50	0 / 10	--	--	--	1.25	0.0	1.25	1.25	123,000	-- / --	0.00002	NO
Acetone	0.56 - 9.20	0 / 10	--	--	--	1.47	1.18	2.15	1.17	564,000	-- / --	0.00002	NO
Benzene	0.50 - 0.50	1 / 10	0.080	0.080	YS24-GW02D-0610	0.23	0.054	0.26	0.22	110	0 / 10	0.001	NO
Bromodichloromethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
Bromoform	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	640	-- / --	0.001	NO
Bromomethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	120	-- / --	0.004	NO
Carbon disulfide	0.061 - 0.50	4 / 10	0.031	0.20	YS24-GW04S-0610	0.13	0.099	0.19	0.096	0.92	0 / 10	0.22	NO
Carbon tetrachloride	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	1,500	-- / --	0.0003	NO
Chlorobenzene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	25.0	-- / --	0.02	NO
Chloroethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
Chloroform	0.50 - 0.50	3 / 10	0.086	0.18	YS24-GW01D-0610	0.21	0.069	0.25	0.20	815	0 / 10	0.0002	NO
Chloromethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	2,700	-- / --	0.0002	NO
cis-1,2-Dichloroethene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	680	-- / --	0.001	NO
cis-1,3-Dichloropropene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	7.90	-- / --	0.06	NO
Cyclohexane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
Dibromochloromethane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
Dichlorodifluoromethane (Freon-12)	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
Ethylbenzene	0.50 - 0.50	2 / 10	0.057	0.083	YS24-GW02D-0610	0.21	0.076	0.26	0.19	25.0	0 / 10	0.003	NO
Isopropylbenzene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	2.60	-- / --	0.19	NO
m- and p-Xylene	1.00 - 1.00	1 / 10	0.13	0.13	YS24-GW02D-0610	0.46	0.12	0.53	0.44	19.0	0 / 10	0.01	NO
Methyl acetate	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO
Methylcyclohexane	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO

TABLE 7-24

Screening Statistics - Site 24 Groundwater

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Methylene chloride	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	2,560	-- / --	0.0002	NO
Methyl-tert-butyl ether (MTBE)	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	5,000	-- / --	0.0001	NO
o-Xylene	0.50 - 0.50	2 / 10	0.038	0.060	YS24-GW02D-0610	0.21	0.085	0.26	0.18	19.0	0 / 10	0.003	NO
Styrene	0.50 - 0.50	1 / 10	0.021	0.021	YS24-GW01D-0610	0.23	0.072	0.27	0.20	910	0 / 10	0.00002	NO
Tetrachloroethene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	45.0	-- / --	0.01	NO
Toluene	0.069 - 0.17	1 / 10	3.70	3.70	YS24-GW02D-0610	0.42	1.15	1.09	0.085	215	0 / 10	0.02	NO
trans-1,2-Dichloroethene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	680	-- / --	0.001	NO
trans-1,3-Dichloropropene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	7.90	-- / --	0.06	NO
Trichloroethene	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	1,940	-- / --	0.0003	NO
Trichlorofluoromethane (Freon-11)	0.50 - 0.50	1 / 10	1.00	1.00	YS24-GW03S-0610	0.33	0.24	0.46	0.29	NSV	-- / --	NSV	**YES**
Vinyl chloride	0.50 - 0.50	0 / 10	--	--	--	0.25	0.0	0.25	0.25	930	-- / --	0.001	NO
Xylene, total	0.50 - 0.50	2 / 10	0.038	0.21	YS24-GW02D-0610	0.22	0.067	0.26	0.20	19.0	0 / 10	0.01	NO
Explosives (UG/L)													
1,3,5-Trinitrobenzene	2.50 - 2.50	1 / 10	1.18	1.18	YS24-GW06S-0610	1.24	0.022	1.26	1.24	15.0	0 / 10	0.08	NO
1,3-Dinitrobenzene	2.50 - 2.50	0 / 10	--	--	--	1.25	0.0	1.25	1.25	180	-- / --	0.01	NO
2,4,6-Trinitrotoluene	2.50 - 2.50	2 / 10	1.32	1.66	YS24-GW06S-0610	1.30	0.13	1.37	1.29	100	0 / 10	0.02	NO
2-Amino-4,6-dinitrotoluene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	19.0	-- / --	0.26	NO
2-Nitrotoluene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	3,400	-- / --	0.001	NO
3-Nitrotoluene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	750	-- / --	0.01	NO
4-Amino-2,6-dinitrotoluene	5.00 - 5.00	1 / 10	0.78	0.78	YS24-GW06S-0610	2.33	0.54	2.64	2.23	19.0	0 / 10	0.04	NO
4-Nitrotoluene	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	1,900	-- / --	0.003	NO
HMX	2.50 - 2.50	0 / 10	--	--	--	1.25	0.0	1.25	1.25	330	-- / --	0.01	NO
RDX	4.00 - 4.00	1 / 10	1.78	1.78	YS24-GW05S-0610	1.98	0.070	2.02	1.98	5,000	0 / 10	0.0004	NO
Tetryl	5.00 - 5.00	0 / 10	--	--	--	2.50	0.0	2.50	2.50	8.00	-- / --	0.63	NO

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - Macronutrient - Not considered to be a COPC

TABLE 7-25

Screening Statistics - Site 24 Groundwater - York River

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?	COPC with DF of 10?
Inorganics (UG/L)																					
Aluminum	37.9 - 234	0 / 5	--	--	--	46.2	40.3	84.6	36.6	87.0	-- / --	2.69	**YES**	0.97	0.53	NO	--	-- / --	--	NO	NO
Copper	4.40 - 5.00	0 / 5	--	--	--	2.44	0.13	2.57	2.44	3.73	-- / --	1.34	**YES**	0.69	0.65	NO	--	-- / --	--	NO	NO
Cyanide	10.0 - 10.0	2 / 5	4.50	5.40	YS24-GW05S-0610	4.98	0.32	5.28	4.97	1.00	2 / 5	5.40	**YES**	5.28	4.98	**YES**	--	-- / --	--	**YES**	NO
Manganese	1.40 - 13.6	2 / 5	27.8	113	YS24-GW01D-0610	29.8	47.8	75.4	6.54	100	1 / 5	1.13	**YES**	0.75	0.30	NO	--	-- / --	--	NO	NO
Silver	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	0.23	-- / --	21.7	**YES**	10.9	10.9	NO[3]	--	-- / --	--	NO[3]	NO[3]
Dissolved Metals (UG/L)																					
Aluminum	56.7 - 89.4	0 / 5	--	--	--	35.3	6.04	41.0	34.9	87.0	-- / --	1.03	**YES**	0.47	0.41	NO	--	-- / --	--	NO	NO
Copper	5.00 - 5.00	3 / 5	2.90	4.20	YS24-GW03S-0610	3.04	0.70	3.71	2.98	3.10	2 / 5	1.35	**YES**	1.20	0.98	**YES**	3.00	2 / 5	1.40	**YES**	NO
Manganese	1.40 - 1.50	3 / 5	16.0	110	YS24-GW01D-0610	31.2	45.6	74.6	7.65	100	1 / 5	1.10	**YES**	0.75	0.31	NO	--	-- / --	--	NO	NO
Silver	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	0.23	-- / --	21.7	**YES**	10.9	10.9	NO[3]	--	-- / --	--	NO[3]	NO[3]
Pesticides (UG/L)																					
4,4'-DDD	0.10 - 0.10	0 / 5	--	--	--	0.050	0.0	0.050	0.050	0.025	-- / --	4.00	**YES**	2.00	2.00	NO[3]	--	-- / --	--	NO[3]	NO[3]
4,4'-DDT	0.10 - 0.10	0 / 5	--	--	--	0.050	0.0	0.050	0.050	0.0065	-- / --	15.4	**YES**	7.69	7.69	NO[3]	--	-- / --	--	NO[3]	NO[3]
alpha-Chlordane	0.050 - ####	0 / 5	--	--	--	0.025	0.0	0.025	0.025	0.0040	-- / --	12.5	**YES**	6.25	6.25	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endosulfan I	0.050 - ####	2 / 5	0.0056	0.026	YS24-GW06S-0610	0.021	0.0088	0.030	0.019	0.0087	1 / 5	2.99	**YES**	3.41	2.45	**YES**	--	-- / --	--	**YES**	NO
Endosulfan sulfate	0.10 - 0.10	0 / 5	--	--	--	0.050	0.0	0.050	0.050	0.0087	-- / --	11.5	**YES**	5.75	5.75	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endrin aldehyde	##### - 0.10	0 / 5	--	--	--	0.015	0.020	0.034	0.0079	0.010	-- / --	10.0	**YES**	3.42	1.50	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endrin ketone	0.10 - 0.10	0 / 5	--	--	--	0.050	0.0	0.050	0.050	0.010	-- / --	10.0	**YES**	5.00	5.00	NO[3]	--	-- / --	--	NO[3]	NO[3]
gamma-BHC (Lindane)	0.050 - ####	0 / 5	--	--	--	0.025	0.0	0.025	0.025	0.016	-- / --	3.13	**YES**	1.56	1.56	NO[3]	--	-- / --	--	NO[3]	NO[3]
gamma-Chlordane	0.050 - ####	1 / 5	0.0061	0.0061	YS24-GW06S-0610	0.021	0.0085	0.029	0.019	0.0040	1 / 5	1.53	**YES**	7.32	5.31	**YES**	--	-- / --	--	**YES**	NO
Heptachlor	0.050 - ####	0 / 5	--	--	--	0.025	0.0	0.025	0.025	0.0036	-- / --	13.9	**YES**	6.94	6.94	NO[3]	--	-- / --	--	NO[3]	NO[3]
Heptachlor epoxide	0.050 - ####	1 / 5	0.0067	0.0067	YS24-GW10S-0610	0.021	0.0082	0.029	0.019	0.0036	1 / 5	1.86	**YES**	8.10	5.93	**YES**	--	-- / --	--	**YES**	NO
Methoxychlor	0.50 - 0.50	1 / 5	0.036	0.036	YS24-GW06S-0610	0.21	0.096	0.30	0.17	0.030	1 / 5	1.20	**YES**	9.95	6.91	**YES**	--	-- / --	--	**YES**	NO
Toxaphene	2.50 - 2.50	0 / 5	--	--	--	1.25	0.0	1.25	1.25	0.21	-- / --	11.9	**YES**	5.95	5.95	NO[3]	--	-- / --	--	NO[3]	NO[3]
Polychlorinated Biphenyls (UG/L)																					
Aroclor-1016	0.93 - 0.93	0 / 5	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1221	1.30 - 1.30	0 / 5	--	--	--	0.65	0.0	0.65	0.65	0.030	-- / --	43.3	**YES**	21.7	21.7	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1232	0.93 - 0.93	0 / 5	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1242	0.63 - 0.63	0 / 5	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1248	0.63 - 0.63	0 / 5	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1254	0.63 - 0.63	0 / 5	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1260	0.93 - 0.93	0 / 5	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Semivolatile Organic Compounds (UG/L)																					
2-Chloronaphthalene	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	0.40	-- / --	12.5	**YES**	6.25	6.25	NO[3]	--	-- / --	--	NO[3]	NO[3]
4,6-Dinitro-2-methylphenol	10.0 - 10.0	0 / 5	--	--	--	5.00	0.0	5.00	5.00	2.30	-- / --	4.35	**YES**	2.17	2.17	NO[3]	--	-- / --	--	NO[3]	NO[3]
4-Bromophenyl-phenylether	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	1.50	-- / --	3.33	**YES**	1.67	1.67	NO[3]	--	-- / --	--	NO[3]	NO[3]
4-Chloro-3-methylphenol	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	0.30	-- / --	16.7	**YES**	8.33	8.33	NO[3]	--	-- / --	--	NO[3]	NO[3]
Anthracene	0.20 - 0.20	0 / 5	--	--	--	0.10	0.0	0.10	0.10	0.18	-- / --	1.11	**YES**	0.56	0.56	NO	--	-- / --	--	NO	NO
Benzo(a)anthracene	0.20 - 0.20	0 / 5	--	--	--	0.10	0.0	0.10	0.10	0.027	-- / --	7.41	**YES**	3.70	3.70	NO[3]	--	-- / --	--	NO[3]	NO[3]
Benzo(a)pyrene	0.20 - 0.20	0 / 5	--	--	--	0.10	0.0	0.10	0.10	0.014	-- / --	14.3	**YES**	7.14	7.14	NO[3]	--	-- / --	--	NO[3]	NO[3]
Di-n-butylphthalate	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	3.40	-- / --	1.47	**YES**	0.74	0.74	NO	--	-- / --	--	NO	NO
Hexachlorobenzene	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	3.68	-- / --	1.36	**YES**	0.68	0.68	NO	--	-- / --	--	NO	NO
Hexachlorobutadiene	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	0.32	-- / --	15.6	**YES**	7.81	7.81	NO[3]	--	-- / --	--	NO[3]	NO[3]

TABLE 7-25

Screening Statistics - Site 24 Groundwater - York River

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?	COPC with DF of 10?
Hexachlorocyclopentadiene	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	0.070	-- / --	71.4	**YES**	35.7	35.7	NO[3]	--	-- / --	--	NO[3]	NO[3]
Indeno(1,2,3-cd)pyrene	5.00 - 5.00	0 / 5	--	--	--	2.50	0.0	2.50	2.50	4.31	-- / --	1.16	**YES**	0.58	0.58	NO	--	-- / --	--	NO	NO
Pentachlorophenol	10.0 - 10.0	0 / 5	--	--	--	5.00	0.0	5.00	5.00	7.90	-- / --	1.27	**YES**	0.63	0.63	NO	--	-- / --	--	NO	NO
Volatile Organic Compounds (UG/L)																					
Trichlorofluoromethane (Freon-11)	0.50 - 0.50	1 / 5	1.00	1.00	YS24-GW03S-0610	0.40	0.34	0.72	0.33	NSV	-- / --	NSV	**YES**	NSV	NSV	**YES**	--	-- / --	--	**YES**	**YES**

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - See uncertainty section

4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-26

Screening Statistics - Site 24 Groundwater - Felgates Creek

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?	COPC with DF of 10?
Inorganics (UG/L)																					
Aluminum	52.4 - 70.1	0 / 2	--	--	--	30.6	6.26	58.6	30.3	87.0	-- / --	0.81	NO	--	--	NO	--	-- / --	--	NO	NO
Copper	1.20 - 5.00	0 / 2	--	--	--	1.55	1.34	7.55	1.22	3.73	-- / --	1.34	**YES**	2.02	0.42	NO[3]	--	-- / --	--	NO[3]	NO[3]
Cyanide	10.0 - 10.0	0 / 2	--	--	--	5.00	0.0	5.00	5.00	1.00	-- / --	10.0	**YES**	5.00	5.00	NO[3]	--	-- / --	--	NO[3]	NO[3]
Manganese	7.00 - 7.00	1 / 2	4.90	4.90	YS24-GW09S-0610	4.20	0.99	8.62	4.14	100	0 / 2	0.05	NO	--	--	NO	--	-- / --	--	NO	NO
Silver	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	0.23	-- / --	21.7	**YES**	10.9	10.9	NO[3]	--	-- / --	--	NO[3]	NO[3]
Dissolved Metals (UG/L)																					
Aluminum	59.1 - 60.9	0 / 2	--	--	--	30.0	0.64	32.8	30.0	87.0	-- / --	0.70	NO	--	--	NO	--	-- / --	--	NO	NO
Copper	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	3.10	-- / --	1.61	**YES**	0.81	0.81	NO				NO	NO
Manganese	-- - --	2 / 2	5.50	7.70	YS24-GW04S-0610	6.60	1.56	13.5	6.51	100	0 / 2	0.08	NO	--	--	NO	--	-- / --	--	NO	NO
Silver	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	0.23	-- / --	21.7	**YES**	10.9	10.9	NO[3]	--	-- / --	--	NO[3]	NO[3]
Pesticides (UG/L)																					
4,4'-DDD	0.10 - 0.10	0 / 2	--	--	--	0.050	0.0	0.050	0.050	0.025	-- / --	4.00	**YES**	2.00	2.00	NO[3]	--	-- / --	--	NO[3]	NO[3]
4,4'-DDT	0.10 - 0.10	0 / 2	--	--	--	0.050	0.0	0.050	0.050	0.0065	-- / --	15.4	**YES**	7.69	7.69	NO[3]	--	-- / --	--	NO[3]	NO[3]
alpha-Chlordane	#### - ####	0 / 2	--	--	--	0.025	0.0	0.025	0.025	0.0040	-- / --	12.5	**YES**	6.25	6.25	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endosulfan I	#### - ####	0 / 2	--	--	--	0.025	0.0	0.025	0.025	0.0087	-- / --	5.75	**YES**	2.87	2.87	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endosulfan sulfate	0.10 - 0.10	0 / 2	--	--	--	0.050	0.0	0.050	0.050	0.0087	-- / --	11.5	**YES**	5.75	5.75	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endrin aldehyde	#### - 0.10	0 / 2	--	--	--	0.030	0.029	0.16	0.021	0.010	-- / --	10.0	**YES**	15.9	2.95	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endrin ketone	0.10 - 0.10	0 / 2	--	--	--	0.050	0.0	0.050	0.050	0.010	-- / --	10.0	**YES**	5.00	5.00	NO[3]	--	-- / --	--	NO[3]	NO[3]
gamma-BHC (Lindane)	#### - ####	0 / 2	--	--	--	0.025	0.0	0.025	0.025	0.016	-- / --	3.13	**YES**	1.56	1.56	NO[3]	--	-- / --	--	NO[3]	NO[3]
gamma-Chlordane	#### - ####	0 / 2	--	--	--	0.025	0.0	0.025	0.025	0.0040	-- / --	12.5	**YES**	6.25	6.25	NO[3]	--	-- / --	--	NO[3]	NO[3]
Heptachlor	#### - ####	0 / 2	--	--	--	0.025	0.0	0.025	0.025	0.0036	-- / --	13.9	**YES**	6.94	6.94	NO[3]	--	-- / --	--	NO[3]	NO[3]
Heptachlor epoxide	#### - ####	1 / 2	0.028	0.028	YS24-GW04S-0610	0.027	0.0021	0.036	0.026	0.0036	1 / 2	7.78	**YES**	9.99	7.36	**YES**	--	-- / --	--	**YES**	NO
Methoxychlor	0.50 - 0.50	0 / 2	--	--	--	0.25	0.0	0.25	0.25	0.030	-- / --	16.7	**YES**	8.33	8.33	NO[3]	--	-- / --	--	NO[3]	NO[3]
Toxaphene	2.50 - 2.50	0 / 2	--	--	--	1.25	0.0	1.25	1.25	0.21	-- / --	11.9	**YES**	5.95	5.95	NO[3]	--	-- / --	--	NO[3]	NO[3]
Polychlorinated Biphenyls (UG/L)																					
Aroclor-1016	0.93 - 0.93	0 / 2	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1221	1.30 - 1.30	0 / 2	--	--	--	0.65	0.0	0.65	0.65	0.030	-- / --	43.3	**YES**	21.7	21.7	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1232	0.93 - 0.93	0 / 2	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1242	0.63 - 0.63	0 / 2	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1248	0.63 - 0.63	0 / 2	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1254	0.63 - 0.63	0 / 2	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1260	0.93 - 0.93	0 / 2	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Semivolatile Organic Compounds (UG/L)																					
2-Chloronaphthalene	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	0.40	-- / --	12.5	**YES**	6.25	6.25	NO[3]	--	-- / --	--	NO[3]	NO[3]
4,6-Dinitro-2-methylphenol	10.0 - 10.0	0 / 2	--	--	--	5.00	0.0	5.00	5.00	2.30	-- / --	4.35	**YES**	2.17	2.17	NO[3]	--	-- / --	--	NO[3]	NO[3]
4-Bromophenyl-phenylether	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	1.50	-- / --	3.33	**YES**	1.67	1.67	NO[3]	--	-- / --	--	NO[3]	NO[3]
4-Chloro-3-methylphenol	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	0.30	-- / --	16.7	**YES**	8.33	8.33	NO[3]	--	-- / --	--	NO[3]	NO[3]
Anthracene	0.20 - 0.20	0 / 2	--	--	--	0.10	0.0	0.10	0.10	0.18	-- / --	1.11	**YES**	0.56	0.56	NO	--	-- / --	--	NO	NO
Benzo(a)anthracene	0.20 - 0.20	0 / 2	--	--	--	0.10	0.0	0.10	0.10	0.027	-- / --	7.41	**YES**	3.70	3.70	NO[3]	--	-- / --	--	NO[3]	NO[3]

TABLE 7-26

Screening Statistics - Site 24 Groundwater - Felgates Creek

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?	COPC with DF of 10?
Benzo(a)pyrene	0.20 - 0.20	0 / 2	--	--	--	0.10	0.0	0.10	0.10	0.014	-- / --	14.3	**YES**	7.14	7.14	NO[3]	--	-- / --	--	NO[3]	NO[3]
Di-n-butylphthalate	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	3.40	-- / --	1.47	**YES**	0.74	0.74	NO	--	-- / --	--	NO	NO
Hexachlorobenzene	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	3.68	-- / --	1.36	**YES**	0.68	0.68	NO	--	-- / --	--	NO	NO
Hexachlorobutadiene	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	0.32	-- / --	15.6	**YES**	7.81	7.81	NO[3]	--	-- / --	--	NO[3]	NO[3]
Hexachlorocyclopentadiene	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	0.070	-- / --	71.4	**YES**	35.7	35.7	NO[3]	--	-- / --	--	NO[3]	NO[3]
Indeno(1,2,3-cd)pyrene	5.00 - 5.00	0 / 2	--	--	--	2.50	0.0	2.50	2.50	4.31	-- / --	1.16	**YES**	0.58	0.58	NO	--	-- / --	--	NO	NO
Pentachlorophenol	10.0 - 10.0	0 / 2	--	--	--	5.00	0.0	5.00	5.00	7.90	-- / --	1.27	**YES**	0.63	0.63	NO	--	-- / --	--	NO	NO
Volatile Organic Compounds (UG/L)																					
Trichlorofluoromethane (Freon-11)	0.50 - 0.50	0 / 2	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO	NO

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - See uncertainty section

4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-27

Screening Statistics - Site 24 Groundwater - Indian Field Creek

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?	COPC with DF of 10?
Inorganics (UG/L)																					
Aluminum	62.0 - 135	0 / 3	--	--	--	44.5	20.1	78.3	41.8	87.0	-- / --	1.55	**YES**	0.90	0.51	NO	--	-- / --	--	NO	NO
Copper	1.20 - 5.00	0 / 3	--	--	--	1.25	1.08	3.08	0.99	3.73	-- / --	1.34	**YES**	0.82	0.34	NO	--	-- / --	--	NO	NO
Cyanide	10.0 - 10.0	0 / 3	--	--	--	5.00	0.0	5.00	5.00	1.00	-- / --	10.0	**YES**	5.00	5.00	NO[3]	--	-- / --	--	NO[3]	NO[3]
Manganese	3.30 - 3.30	2 / 3	15.4	18.4	YS24-GW02D-0610	11.8	8.93	26.9	7.76	100	0 / 3	0.18	NO	--	--	NO	--	-- / --	--	NO	NO
Silver	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	0.23	-- / --	21.7	**YES**	10.9	10.9	NO[3]	--	-- / --	--	NO[3]	NO[3]
Dissolved Metals (UG/L)																					
Aluminum	42.8 - 96.8	0 / 3	--	--	--	34.9	13.5	57.7	33.1	87.0	-- / --	1.11	**YES**	0.66	0.40	NO	--	-- / --	--	NO	NO
Copper	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	3.10	-- / --	1.61	**YES**	0.81	0.81	NO				NO	NO
Manganese	3.30 - 3.80	1 / 3	13.4	13.4	YS24-GW08S-0610	5.65	6.71	17.0	3.48	100	0 / 3	0.13	NO	--	--	NO	--	-- / --	--	NO	NO
Silver	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	0.23	-- / --	21.7	**YES**	10.9	10.9	NO[3]	--	-- / --	--	NO[3]	NO[3]
Pesticides (UG/L)																					
4,4'-DDD	0.10 - 0.10	0 / 3	--	--	--	0.050	8.50E-18	0.050	0.050	0.025	-- / --	4.00	**YES**	2.00	2.00	NO[3]	--	-- / --	--	NO[3]	NO[3]
4,4'-DDT	0.10 - 0.10	0 / 3	--	--	--	0.050	8.50E-18	0.050	0.050	0.0065	-- / --	15.4	**YES**	7.69	7.69	NO[3]	--	-- / --	--	NO[3]	NO[3]
alpha-Chlordane	0.050 - ####	0 / 3	--	--	--	0.025	4.25E-18	0.025	0.025	0.0040	-- / --	12.5	**YES**	6.25	6.25	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endosulfan I	0.050 - ####	1 / 3	0.084	0.084	YS24-GW02D-0610	0.045	0.034	0.10	0.037	0.0087	1 / 3	9.66	**YES**	11.7	5.13	**YES**	--	-- / --	--	**YES**	NO
Endosulfan sulfate	0.10 - 0.10	0 / 3	--	--	--	0.050	8.50E-18	0.050	0.050	0.0087	-- / --	11.5	**YES**	5.75	5.75	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endrin aldehyde	0.030 - 0.10	0 / 3	--	--	--	0.038	0.020	0.072	0.033	0.010	-- / --	10.0	**YES**	7.24	3.83	NO[3]	--	-- / --	--	NO[3]	NO[3]
Endrin ketone	0.10 - 0.10	0 / 3	--	--	--	0.050	8.50E-18	0.050	0.050	0.010	-- / --	10.0	**YES**	5.00	5.00	NO[3]	--	-- / --	--	NO[3]	NO[3]
gamma-BHC (Lindane)	0.050 - ####	0 / 3	--	--	--	0.025	4.25E-18	0.025	0.025	0.016	-- / --	3.13	**YES**	1.56	1.56	NO[3]	--	-- / --	--	NO[3]	NO[3]
gamma-Chlordane	0.050 - ####	0 / 3	--	--	--	0.025	4.25E-18	0.025	0.025	0.0040	-- / --	12.5	**YES**	6.25	6.25	NO[3]	--	-- / --	--	NO[3]	NO[3]
Heptachlor	0.050 - ####	0 / 3	--	--	--	0.025	4.25E-18	0.025	0.025	0.0036	-- / --	13.9	**YES**	6.94	6.94	NO[3]	--	-- / --	--	NO[3]	NO[3]
Heptachlor epoxide	0.050 - ####	2 / 3	0.0060	0.0098	YS24-GW02D-0610	0.014	0.010	0.031	0.011	0.0036	2 / 3	2.72	**YES**	8.49	3.78	**YES**	--	-- / --	--	**YES**	NO
Methoxychlor	0.50 - 0.50	0 / 3	--	--	--	0.25	0.0	0.25	0.25	0.030	-- / --	16.7	**YES**	8.33	8.33	NO[3]	--	-- / --	--	NO[3]	NO[3]
Toxaphene	2.50 - 2.50	0 / 3	--	--	--	1.25	0.0	1.25	1.25	0.21	-- / --	11.9	**YES**	5.95	5.95	NO[3]	--	-- / --	--	NO[3]	NO[3]
Polychlorinated Biphenyls (UG/L)																					
Aroclor-1016	0.93 - 0.93	0 / 3	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1221	1.30 - 1.30	0 / 3	--	--	--	0.65	0.0	0.65	0.65	0.030	-- / --	43.3	**YES**	21.7	21.7	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1232	0.93 - 0.93	0 / 3	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1242	0.63 - 0.63	0 / 3	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1248	0.63 - 0.63	0 / 3	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1254	0.63 - 0.63	0 / 3	--	--	--	0.32	0.0	0.32	0.32	0.030	-- / --	21.0	**YES**	10.5	10.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Aroclor-1260	0.93 - 0.93	0 / 3	--	--	--	0.47	0.0	0.47	0.47	0.030	-- / --	31.0	**YES**	15.5	15.5	NO[3]	--	-- / --	--	NO[3]	NO[3]
Semivolatile Organic Compounds (UG/L)																					
2-Chloronaphthalene	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	0.40	-- / --	12.5	**YES**	6.25	6.25	NO[3]	--	-- / --	--	NO[3]	NO[3]
4,6-Dinitro-2-methylphenol	10.0 - 10.0	0 / 3	--	--	--	5.00	0.0	5.00	5.00	2.30	-- / --	4.35	**YES**	2.17	2.17	NO[3]	--	-- / --	--	NO[3]	NO[3]
4-Bromophenyl-phenylether	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	1.50	-- / --	3.33	**YES**	1.67	1.67	NO[3]	--	-- / --	--	NO[3]	NO[3]
4-Chloro-3-methylphenol	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	0.30	-- / --	16.7	**YES**	8.33	8.33	NO[3]	--	-- / --	--	NO[3]	NO[3]
Anthracene	0.20 - 0.20	0 / 3	--	--	--	0.10	1.70E-17	0.10	0.10	0.18	-- / --	1.11	**YES**	0.56	0.56	NO	--	-- / --	--	NO	NO
Benzo(a)anthracene	0.20 - 0.20	0 / 3	--	--	--	0.10	1.70E-17	0.10	0.10	0.027	-- / --	7.41	**YES**	3.70	3.70	NO[3]	--	-- / --	--	NO[3]	NO[3]

TABLE 7-27

Screening Statistics - Site 24 Groundwater - Indian Field Creek

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Geometric Mean	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	95% UCL Hazard Quotient	Mean Hazard Quotient	Step 3A COPC?	Background UTL	Frequency of UTL Exceedance[4]	Maximum Ratio	COPC for Risk Evaluation?	COPC with DF of 10?
Benzo(a)pyrene	0.20 - 0.20	0 / 3	--	--	--	0.10	1.70E-17	0.10	0.10	0.014	-- / --	14.3	**YES**	7.14	7.14	NO[3]	--	-- / --	--	NO[3]	NO[3]
Di-n-butylphthalate	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	3.40	-- / --	1.47	**YES**	0.74	0.74	NO	--	-- / --	--	NO	NO
Hexachlorobenzene	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	3.68	-- / --	1.36	**YES**	0.68	0.68	NO	--	-- / --	--	NO	NO
Hexachlorobutadiene	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	0.32	-- / --	15.6	**YES**	7.81	7.81	NO[3]	--	-- / --	--	NO[3]	NO[3]
Hexachlorocyclopentadiene	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	0.070	-- / --	71.4	**YES**	35.7	35.7	NO[3]	--	-- / --	--	NO[3]	NO[3]
Indeno(1,2,3-cd)pyrene	5.00 - 5.00	0 / 3	--	--	--	2.50	0.0	2.50	2.50	4.31	-- / --	1.16	**YES**	0.58	0.58	NO	--	-- / --	--	NO	NO
Pentachlorophenol	10.0 - 10.0	0 / 3	--	--	--	5.00	0.0	5.00	5.00	7.90	-- / --	1.27	**YES**	0.63	0.63	NO	--	-- / --	--	NO	NO
Volatile Organic Compounds (UG/L)																					
Trichlorofluoromethane (Freon-11)	0.50 - 0.50	0 / 3	--	--	--	0.25	0.0	0.25	0.25	NSV	-- / --	NSV	NO	--	--	NO	--	-- / --	--	NO	NO

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

3 - See uncertainty section

4 - Count of samples exceeding or equaling the UTL / number of detected samples

TABLE 7-28

Eco-SSL Values for Birds and Mammals (Bioaccumualtive Chemicals)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Bird	Mammal	Units	Reference
Metals				
Arsenic	43.0	46.0	mg/kg	USEPA 2005b
Cadmium	0.77	0.36	mg/kg	USEPA 2005e
Chromium	26.0	34.0	mg/kg	USEPA 2008
Copper	28.0	49.0	mg/kg	USEPA 2007a
Lead	11.0	56.0	mg/kg	USEPA 2005g
Nickel	210	130	mg/kg	USEPA 2007c
Selenium	1.20	0.63	mg/kg	USEPA 2007d
Silver	4.20	14.0	mg/kg	USEPA 2006a
Zinc	46.0	79.0	mg/kg	USEPA 2007e
Organics				
4,4'-DDT (and metabolites)	0.093	0.021	mg/kg	USEPA 2007f
Dieldrin	0.022	0.0049	mg/kg	USEPA 2007g
Pentachlorophenol	2.10	2.80	mg/kg	USEPA 2007h
PAHs - LMW	--	100	mg/kg	USEPA 2007i
PAHs - HMW	--	1.10	mg/kg	USEPA 2007i

TABLE 7-29

Screening Statistics - Surface Soil - Mammal/Bird Eco-SSLs

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	95% UCL (Norm)	Arithmetic Mean	Mammal Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Bird Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
Inorganics (MG/KG)															
Arsenic	0.32 - 1.60	35 / 50	151	11.6	6.15	46.0	2 / 50	3.28	0.25	0.13	43.0	2 / 50	3.51	0.27	0.14
Cadmium	0.06 - 0.56	34 / 50	4.30	0.61	0.45	0.36	20 / 50	11.9	1.69	1.26	0.77	7 / 50	5.58	0.79	0.59
Chromium	-- - --	50 / 50	24.6	9.80	8.64	34.0	0 / 50	0.72	0.29	0.25	26.0	0 / 50	0.95	0.38	0.33
Copper	1.30 - 3.30	46 / 50	139	13.3	8.37	49.0	1 / 50	2.84	0.27	0.17	28.0	3 / 50	4.96	0.47	0.30
Lead	-- - --	50 / 50	46.9	14.3	12.2	56.0	0 / 50	0.84	0.26	0.22	11.0	21 / 50	4.26	1.30	1.11
Nickel	-- - --	50 / 50	10.5	4.11	3.66	130	0 / 50	0.08	0.03	0.03	210	0 / 50	0.05	0.02	0.02
Selenium	0.52 - 0.92	4 / 50	0.78	0.36	0.33	0.63	2 / 50	1.24	0.56	0.52	1.20	0 / 50	0.65	0.30	0.27
Silver	0.21 - 0.67	3 / 50	8.10	0.75	0.47	14.0	0 / 50	0.58	0.05	0.03	4.20	1 / 50	1.93	0.18	0.11
Zinc	-- - --	50 / 50	68.3	25.3	22.3	79.0	0 / 50	0.86	0.32	0.28	46.0	2 / 50	1.48	0.55	0.48
Pesticides (UG/KG)															
4,4'-DDD	3.40 - 4.50	6 / 50	35.0	3.54	2.42	21.0	1 / 50	1.67	0.17	0.12	93.0	0 / 50	0.38	0.04	0.03
4,4'-DDE	3.40 - 4.30	17 / 50	11.0	2.08	1.74	21.0	0 / 50	0.52	0.10	0.08	93.0	0 / 50	0.12	0.02	0.02
4,4'-DDT	0.58 - 4.30	15 / 50	29.0	3.17	2.23	21.0	1 / 50	1.38	0.15	0.11	93.0	0 / 50	0.31	0.03	0.02
Dieldrin	3.40 - 4.50	5 / 50	6.60	2.04	1.85	4.90	1 / 50	1.35	0.42	0.38	22.0	0 / 50	0.30	0.09	0.08
Semivolatile Organic Compounds (UG/KG)															
PAH (HMW)	810 - ####	22 / 50	1,805	827	752	1,100	5 / 50	1.64	0.75	0.68	--	-- - --	--	--	--
PAH (LMW)	855 - ####	21 / 50	1,482	796	743	100,000	0 / 50	0.01	0.01	0.01	--	-- - --	--	--	--
Pentachlorophenol[1]	350 - 940	0 / 50	--	311	281	2,800	0 / 50	0.34	0.11	0.10	2,100	0 / 50	0.45	0.15	0.13

Shaded cells indicate HQ > 1

1 - HQs based upon reporting limits

TABLE 7-30

Hazard Quotients for Terrestrial Food Web Exposures - Screening (Maximum)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			Red Fox			American Robin (omnivore)			American Robin (invertivore			Mourning Dove			Red-tailed Hawk		
	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																					
Arsenic	#######	#######	4.91E-01	#######	#######	#######	2.37E-01	1.88E-01	1.49E-01	6.09E-01	2.72E-01	1.22E-01	7.71E-01	3.45E-01	1.54E-01	8.66E-01	3.87E-01	1.73E-01	1.42E-02	6.34E-03	2.83E-03
Cadmium	2.61E-01	8.26E-02	2.61E-02	#######	#######	4.11E-01	3.16E-01	1.00E-01	3.16E-02	9.78E-01	4.37E-01	1.96E-01	#######	8.95E-01	4.00E-01	2.06E-01	9.23E-02	4.13E-02	1.37E-01	6.14E-02	2.75E-02
Copper	3.09E-01	2.39E-01	1.85E-01	8.83E-01	6.83E-01	5.29E-01	8.32E-02	7.32E-02	6.45E-02	6.30E-01	3.65E-01	2.11E-01	7.19E-01	4.16E-01	2.41E-01	9.79E-01	5.66E-01	3.28E-01	1.81E-01	1.05E-01	6.05E-02
Lead	8.08E-02	5.87E-02	4.26E-02	6.32E-01	4.60E-01	3.34E-01	8.25E-02	5.99E-02	4.36E-02	3.36E-01	1.50E-01	6.72E-02	5.80E-01	2.60E-01	1.16E-01	5.53E-01	3.91E-01	2.76E-01	7.79E-02	3.48E-02	1.56E-02
Mercury	#######	#######	#######	#######	#######	#######	#######	8.88E-01	6.88E-01	#######	#######	#######	#######	#######	#######	4.64E-01	3.28E-01	2.32E-01	7.61E-02	4.86E-02	3.11E-02
Selenium	2.08E-01	1.62E-01	1.26E-01	5.36E-01	4.17E-01	3.25E-01	1.39E-01	1.08E-01	8.41E-02	1.51E-01	8.17E-02	4.42E-02	2.04E-01	1.10E-01	5.98E-02	2.78E-01	1.97E-01	1.39E-01	5.64E-02	3.05E-02	1.65E-02
Silver	2.54E-02	1.14E-02	5.08E-03	#######	5.44E-01	2.43E-01	2.14E-02	9.56E-03	4.27E-03	#######	7.00E-01	3.13E-01	#######	#######	6.82E-01	3.39E-02	1.51E-02	6.77E-03	2.10E-02	9.41E-03	4.21E-03
Zinc	7.75E-02	3.47E-02	1.55E-02	5.50E-01	2.46E-01	1.10E-01	7.08E-02	3.17E-02	1.42E-02	3.12E-01	1.40E-01	6.24E-02	5.77E-01	2.58E-01	1.15E-01	1.54E-01	6.90E-02	3.09E-02	7.13E-02	3.19E-02	1.43E-02
Polychlorinated Biphenyls																					
Aroclor-1016	5.44E-02	2.43E-02	1.09E-02	3.95E-01	1.77E-01	7.90E-02	7.43E-03	4.70E-03	2.97E-03	6.40E-02	2.86E-02	1.28E-02	1.18E-01	5.26E-02	2.35E-02	3.75E-02	1.68E-02	7.50E-03	2.27E-02	1.02E-02	4.54E-03
Aroclor-1221	2.36E-01	1.06E-01	4.72E-02	#######	4.66E-01	2.08E-01	2.15E-01	9.60E-02	4.29E-02	1.88E-01	8.40E-02	3.75E-02	3.12E-01	1.39E-01	6.23E-02	1.64E-01	7.34E-02	3.28E-02	6.60E-02	2.95E-02	1.32E-02
Aroclor-1232	8.09E-02	3.62E-02	1.62E-02	3.97E-01	1.78E-01	7.94E-02	8.01E-02	3.58E-02	1.60E-02	6.94E-02	3.10E-02	1.39E-02	1.18E-01	5.26E-02	2.35E-02	5.67E-02	2.53E-02	1.13E-02	2.46E-02	1.10E-02	4.91E-03
Aroclor-1242	5.44E-02	2.43E-02	1.09E-02	3.95E-01	1.77E-01	7.90E-02	7.38E-02	3.30E-02	1.48E-02	6.40E-02	2.86E-02	1.28E-02	1.18E-01	5.26E-02	2.35E-02	3.75E-02	1.68E-02	7.50E-03	2.27E-02	1.02E-02	4.54E-03
Aroclor-1248	3.54E-02	1.58E-02	7.07E-03	3.94E-01	1.76E-01	7.88E-02	6.83E-02	3.08E-02	1.39E-02	6.02E-02	2.69E-02	1.20E-02	1.18E-01	5.26E-02	2.35E-02	2.37E-02	1.06E-02	4.73E-03	2.14E-02	9.56E-03	4.28E-03
Aroclor-1254	2.91E-02	1.30E-02	5.83E-03	3.94E-01	1.76E-01	7.87E-02	6.68E-02	3.01E-02	1.36E-02	5.89E-02	2.63E-02	1.18E-02	1.18E-01	5.26E-02	2.35E-02	1.92E-02	8.57E-03	3.83E-03	2.10E-02	9.37E-03	4.19E-03
Aroclor-1260	2.44E-02	1.09E-02	4.89E-03	3.93E-01	1.76E-01	7.86E-02	6.57E-02	2.96E-02	1.33E-02	5.80E-02	2.59E-02	1.16E-02	1.18E-01	5.26E-02	2.35E-02	1.58E-02	7.05E-03	3.15E-03	2.06E-02	9.22E-03	4.12E-03
Pesticides																					
4,4'-DDD	9.29E-03	4.15E-03	1.86E-03	2.49E-01	1.11E-01	4.98E-02	4.08E-02	1.82E-02	8.16E-03	3.22E-02	1.02E-02	3.22E-03	6.85E-02	2.17E-02	6.85E-03	3.16E-03	9.99E-04	3.16E-04	7.01E-02	3.14E-02	1.40E-02
4,4'-DDT	9.70E-03	4.34E-03	1.94E-03	3.10E-01	1.39E-01	6.21E-02	5.03E-02	2.25E-02	1.01E-02	3.99E-02	1.26E-02	3.99E-03	8.57E-02	2.71E-02	8.57E-03	2.71E-03	8.59E-04	2.71E-04	8.66E-02	3.87E-02	1.73E-02
Aldrin	5.41E-05	2.42E-05	1.08E-05	9.50E-04	4.25E-04	1.90E-04	1.61E-04	7.21E-05	3.23E-05	1.21E-03	5.40E-04	2.41E-04	2.48E-03	1.11E-03	4.96E-04	2.43E-04	1.09E-04	4.87E-05	4.26E-04	1.90E-04	8.52E-05
alpha-BHC	7.80E-05	5.51E-05	3.90E-05	6.51E-05	4.60E-05	3.25E-05	2.84E-05	2.01E-05	1.42E-05	2.03E-04	1.01E-04	5.05E-05	1.47E-04	7.33E-05	3.66E-05	4.29E-04	2.14E-04	1.07E-04	7.17E-05	3.58E-05	1.78E-05
alpha-Chlordane	4.36E-04	3.08E-04	2.18E-04	7.85E-03	5.55E-03	3.93E-03	1.33E-03	9.39E-04	6.64E-04	7.50E-03	3.35E-03	1.50E-03	1.55E-02	6.92E-03	3.10E-03	2.56E-03	1.14E-03	5.11E-04	2.64E-03	1.18E-03	5.27E-04
beta-BHC	3.16E-04	2.23E-04	1.58E-04	2.66E-04	1.88E-04	1.33E-04	1.15E-04	8.15E-05	5.76E-05	8.24E-04	4.11E-04	2.05E-04	6.00E-04	2.99E-04	1.49E-04	1.73E-03	8.66E-04	4.32E-04	2.91E-04	1.45E-04	7.24E-05
delta-BHC	8.12E-05	5.74E-05	4.06E-05	8.72E-05	6.16E-05	4.36E-05	3.27E-05	2.31E-05	1.63E-05	2.33E-04	1.16E-04	5.80E-05	2.01E-04	1.00E-04	5.00E-05	4.47E-04	2.23E-04	1.11E-04	8.27E-05	4.13E-05	2.06E-05
Dieldrin	3.22E-02	2.28E-02	1.61E-02	7.64E-01	5.40E-01	3.82E-01	1.26E-01	8.88E-02	6.28E-02	7.18E-02	9.83E-03	1.35E-03	1.52E-01	2.08E-02	2.85E-03	8.14E-03	1.12E-03	1.53E-04	2.49E-02	3.41E-03	4.67E-04
Endosulfan I	6.95E-04	3.11E-04	1.39E-04	5.95E-04	2.66E-04	1.19E-04	2.56E-04	1.14E-04	5.11E-05	9.59E-06	4.29E-06	1.92E-06	7.07E-06	3.16E-06	1.41E-06	2.01E-05	8.98E-06	4.01E-06	3.39E-06	1.51E-06	6.77E-07
Endosulfan II	3.19E-04	1.42E-04	6.37E-05	4.89E-04	2.19E-04	9.77E-05	1.52E-04	6.80E-05	3.04E-05	5.67E-06	2.54E-06	1.13E-06	6.03E-06	2.70E-06	1.21E-06	9.23E-06	4.13E-06	1.85E-06	2.02E-06	9.05E-07	4.05E-07
Endrin	2.01E-04	8.99E-05	4.02E-05	1.42E-03	6.34E-04	2.83E-04	2.68E-04	1.20E-04	5.36E-05	6.21E-03	2.78E-03	1.24E-03	1.14E-02	5.12E-03	2.29E-03	3.15E-03	1.41E-03	6.30E-04	2.18E-03	9.76E-04	4.36E-04
gamma-BHC (Lindane)	3.30E-05	1.48E-05	6.60E-06	4.31E-04	1.93E-04	8.62E-05	7.41E-05	3.32E-05	1.48E-05	4.01E-04	1.79E-04	8.02E-05	8.10E-04	3.62E-04	1.62E-04	9.91E-05	4.43E-05	1.98E-05	1.39E-04	6.21E-05	2.78E-05
gamma-Chlordane	4.48E-04	3.17E-04	2.24E-04	8.07E-03	5.70E-03	4.03E-03	1.36E-03	9.64E-04	6.82E-04	7.70E-03	3.45E-03	1.54E-03	1.59E-02	7.11E-03	3.18E-03	2.63E-03	1.17E-03	5.25E-04	2.71E-03	1.21E-03	5.41E-04
Heptachlor	1.22E-04	5.44E-05	2.43E-05	1.74E-03	7.77E-04	3.47E-04	3.01E-04	1.34E-04	6.01E-05	5.70E-04	2.55E-04	1.14E-04	1.15E-03	5.15E-04	2.30E-04	1.47E-04	6.55E-05	2.93E-05	2.01E-04	9.01E-05	4.03E-05
Heptachlor epoxide	1.93E-04	8.65E-05	3.87E-05	2.91E-03	1.30E-03	5.82E-04	4.96E-04	2.22E-04	9.92E-05	9.67E-04	4.33E-04	1.93E-04	1.98E-03	8.84E-04	3.96E-04	2.08E-04	9.31E-05	4.16E-05	3.36E-04	1.50E-04	6.73E-05
Methoxychlor	6.76E-05	4.78E-05	3.38E-05	1.66E-04	1.18E-04	8.31E-05	4.24E-05	3.00E-05	2.12E-05	1.18E-06	5.28E-07	2.36E-07	1.57E-06	7.01E-07	3.13E-07	1.48E-06	6.60E-07	2.95E-07	4.25E-07	1.90E-07	8.51E-08
Toxaphene	4.89E-03	2.19E-03	9.78E-04	1.70E-02	7.61E-03	3.40E-03	3.87E-03	1.73E-03	7.74E-04	7.63E-02	3.41E-02	1.53E-02	1.15E-01	5.13E-02	2.29E-02	7.62E-02	3.41E-02	1.52E-02	2.76E-02	1.24E-02	5.53E-03
Volatile/Semivolatile Organics																					
1,1,2,2-Tetrachloroethane	1.63E-05	7.29E-06	3.26E-06	2.24E-05	1.00E-05	4.48E-06	7.35E-06	3.29E-06	1.47E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.06E-03	7.51E-04	5.31E-04	6.86E-04	4.85E-04	3.43E-04	3.57E-04	2.53E-04	1.79E-04	1.45E-03	6.47E-04	2.89E-04	8.16E-04	3.65E-04	1.63E-04	3.39E-03	1.52E-03	6.78E-04	5.15E-04	2.30E-04	1.03E-04
1,2-Dichlorobenzene	1.12E-03	5.01E-04	2.24E-04	6.89E-04	3.08E-04	1.38E-04	3.68E-04	1.65E-04	7.37E-05	2.46E-03	1.10E-03	4.93E-04	1.41E-03	6.29E-04	2.81E-04	5.74E-03	2.57E-03	1.15E-03	8.65E-04	3.87E-04	1.73E-04
1,3-Dichlorobenzene	1.05E-03	4.70E-04	2.10E-04	6.84E-04	3.06E-04	1.37E-04	3.52E-04	1.57E-04	7.03E-05	2.35E-03	1.05E-03	4.70E-04	1.41E-03	6.29E-04	2.81E-04	5.39E-03	2.41E-03	1.08E-03	8.26E-04	3.70E-04	1.65E-04
1,4-Dichlorobenzene	4.31E-04	2.49E-04	1.44E-04	2.63E-04	1.52E-04	8.76E-05	1.41E-04	8.15E-05	4.71E-05	3.31E-04	1.48E-04	6.62E-05	1.87E-04	8.38E-05	3.75E-05	7.73E-04	3.46E-04	1.55E-04	1.16E-04	5.19E-05	2.32E-05
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	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	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 7-30

Hazard Quotients for Terrestrial Food Web Exposures - Screening (Maximum)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			Red Fox			American Robin (omnivore)			American Robin (invertivore			Mourning Dove			Red-tailed Hawk		
	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)anthracene	4.39E-03	1.96E-03	8.79E-04	1.32E-02	5.92E-03	2.65E-03	5.50E-04	2.46E-04	1.10E-04	6.17E-04	2.76E-04	1.23E-04	7.93E-04	3.55E-04	1.59E-04	8.22E-04	3.68E-04	1.64E-04	#######	#######	#######
Benzo(a)pyrene	4.77E-03	2.13E-03	9.55E-04	1.73E-02	7.72E-03	3.46E-03	6.38E-04	2.86E-04	1.28E-04	7.72E-04	3.45E-04	1.54E-04	1.09E-03	4.87E-04	2.18E-04	8.89E-04	3.98E-04	1.78E-04	#######	#######	#######
Benzo(b)fluoranthene	1.36E-02	6.09E-03	2.73E-03	1.83E-02	8.18E-03	3.66E-03	1.05E-03	4.71E-04	2.11E-04	1.22E-03	5.44E-04	2.43E-04	1.01E-03	4.50E-04	2.01E-04	2.41E-03	1.08E-03	4.83E-04	#######	#######	#######
Benzo(g,h,i)perylene	5.75E-02	2.58E-02	1.15E-02	5.44E-02	2.44E-02	1.09E-02	3.89E-03	1.74E-03	7.80E-04	4.41E-03	1.97E-03	8.82E-04	2.69E-03	1.20E-03	5.37E-04	1.01E-02	4.53E-03	2.02E-03	#######	#######	#######
Benzo(k)fluoranthene	8.01E-03	3.58E-03	1.60E-03	2.14E-02	9.57E-03	4.28E-03	9.87E-04	4.42E-04	1.98E-04	1.02E-03	4.56E-04	2.04E-04	1.21E-03	5.40E-04	2.41E-04	1.51E-03	6.77E-04	3.03E-04	#######	#######	#######
Chrysene	6.23E-03	2.79E-03	1.25E-03	2.98E-02	1.33E-02	5.97E-03	9.52E-04	4.26E-04	1.91E-04	1.26E-03	5.64E-04	2.52E-04	1.98E-03	8.84E-04	3.95E-04	1.16E-03	5.20E-04	2.32E-04	#######	#######	#######
Dibenz(a,h)anthracene	1.19E-03	5.34E-04	2.39E-04	5.59E-03	2.50E-03	1.12E-03	1.73E-04	7.75E-05	3.47E-05	2.40E-04	1.07E-04	4.80E-05	3.77E-04	1.69E-04	7.54E-05	2.19E-04	9.79E-05	4.38E-05	#######	#######	#######
Hexachlorobenzene	5.90E-03	4.17E-03	2.95E-03	4.24E-02	2.99E-02	2.12E-02	8.08E-03	5.72E-03	4.04E-03	3.64E-01	1.63E-01	7.27E-02	6.63E-01	2.97E-01	1.33E-01	1.95E-01	8.72E-02	3.90E-02	1.30E-01	5.82E-02	2.60E-02
Hexachlorobutadiene	1.39E-02	4.39E-03	1.39E-03	2.72E-02	8.61E-03	2.72E-03	7.58E-03	2.40E-03	7.58E-04	1.11E-02	4.96E-03	2.22E-03	1.33E-02	5.96E-03	2.67E-03	1.58E-02	7.08E-03	3.17E-03	3.98E-03	1.78E-03	7.96E-04
Hexachlorocyclopentadiene	2.25E-04	1.01E-04	4.50E-05	7.16E-04	3.20E-04	1.43E-04	1.67E-04	7.49E-05	3.35E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	5.72E-04	2.56E-04	1.14E-04	5.64E-04	2.52E-04	1.13E-04	2.22E-04	9.94E-05	4.44E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.46E-03	1.55E-03	6.93E-04	1.63E-02	7.31E-03	3.27E-03	5.36E-04	2.40E-04	1.07E-04	6.89E-04	3.08E-04	1.38E-04	1.07E-03	4.79E-04	2.14E-04	6.50E-04	2.91E-04	1.30E-04	#######	#######	#######
Pyrene	3.99E-02	1.78E-02	7.99E-03	3.69E-02	1.65E-02	7.39E-03	2.23E-03	9.99E-04	4.47E-04	3.17E-03	1.42E-03	6.35E-04	2.25E-03	1.01E-03	4.50E-04	6.79E-03	3.04E-03	1.36E-03	#######	#######	#######

Shaded cells indicate HQ > 1

NA - TRV not available

TABLE 7-31

Summary of Meadow Vole Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	151	Regression	8.34E+00	Regresson	2.31E+00	0	6.19E-01	0.252	0.56	1.26	**2.46E+00**	**1.10E+00**	4.91E-01
Cadmium	4.30	Regression	2.64E+01	Regresson	1.38E+00	0	2.01E-01	0.77	2.43	7.70	2.61E-01	8.26E-02	2.61E-02
Copper	139	Regression	1.96E+01	Regresson	1.36E+01	0	1.73E+00	5.60	7.23	9.34	3.09E-01	2.39E-01	1.85E-01
Lead	46.9	Regression	1.79E+01	Regresson	2.30E+00	0	3.80E-01	4.70	6.47	8.90	8.08E-02	5.87E-02	4.26E-02
Mercury	4.70	20.63	9.69E+01	Regresson	8.57E-01	0	2.96E-01	0.032	0.072	0.16	**9.26E+00**	**4.14E+00**	**1.85E+00**
Selenium	0.78	Regression	7.73E-01	Regresson	3.86E-01	0	4.16E-02	0.20	0.26	0.33	2.08E-01	1.62E-01	1.26E-01
Silver	8.10	15.34	1.24E+02	0.037	2.97E-01	0	3.06E-01	12.0	26.9	60.2	2.54E-02	1.14E-02	5.08E-03
Zinc	68.3	Regression	3.42E+02	Regresson	5.04E+01	0	5.84E+00	75.4	169	377	7.75E-02	3.47E-02	1.55E-02
Polychlorinated Biphenyls													
Aroclor-1016	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	7.40E-03	0.136	0.30	0.68	5.44E-02	2.43E-02	1.09E-02
Aroclor-1221	0.39000	Regression	1.14E+00	0.749	2.92E-01	0	3.21E-02	0.136	0.30	0.68	2.36E-01	1.06E-01	4.72E-02
Aroclor-1232	0.19000	Regression	4.27E-01	0.515	9.79E-02	0	1.10E-02	0.136	0.30	0.68	8.09E-02	3.62E-02	1.62E-02
Aroclor-1242	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	7.40E-03	0.136	0.30	0.68	5.44E-02	2.43E-02	1.09E-02
Aroclor-1248	0.19000	Regression	4.27E-01	0.184	3.50E-02	0	4.81E-03	0.136	0.30	0.68	3.54E-02	1.58E-02	7.07E-03
Aroclor-1254	0.19000	Regression	4.27E-01	0.139	2.65E-02	0	3.96E-03	0.136	0.30	0.68	2.91E-02	1.30E-02	5.83E-03
Aroclor-1260	0.19000	Regression	4.27E-01	0.105	2.00E-02	0	3.33E-03	0.136	0.30	0.68	2.44E-02	1.09E-02	4.89E-03
Pesticides													
4,4'-DDD	0.03500	Regression	3.08E-01	Regresson	6.51E-03	0	1.37E-03	0.147	0.329	0.735	9.29E-03	4.15E-03	1.86E-03
4,4'-DDT	0.02900	Regression	3.86E-01	Regresson	5.65E-03	0	1.43E-03	0.147	0.329	0.735	9.70E-03	4.34E-03	1.94E-03
Aldrin	0.00047	3.300	1.55E-03	0.139	6.55E-05	0	1.08E-05	0.20	0.45	1.00	5.41E-05	2.42E-05	1.08E-05
alpha-BHC	0.00071	1.000	7.10E-04	1.735	1.23E-03	0	1.25E-04	1.60	2.26	3.20	7.80E-05	5.51E-05	3.90E-05
alpha-Chlordane	0.07400	4.000	2.96E-01	0.165	1.22E-02	0	2.00E-03	4.58	6.48	9.16	4.36E-04	3.08E-04	2.18E-04
beta-BHC	0.00290	1.000	2.90E-03	1.719	4.99E-03	0	5.05E-04	1.60	2.26	3.20	3.16E-04	2.23E-04	1.58E-04
delta-BHC	0.00097	1.000	9.70E-04	1.311	1.27E-03	0	1.30E-04	1.60	2.26	3.20	8.12E-05	5.74E-05	4.06E-05
Dieldrin	0.00660	14.70	9.70E-02	0.410	2.71E-03	0	4.84E-04	0.015	0.021	0.030	3.22E-02	2.28E-02	1.61E-02
Endosulfan I	0.00061	1.000	6.10E-04	1.687	1.03E-03	0	1.04E-04	0.15	0.34	0.75	6.95E-04	3.11E-04	1.39E-04
Endosulfan II	0.00052	1.000	5.20E-04	0.886	4.61E-04	0	4.78E-05	0.15	0.34	0.75	3.19E-04	1.42E-04	6.37E-05
Endrin	0.00059	3.600	2.12E-03	0.535	3.16E-04	0	3.70E-05	0.18	0.41	0.92	2.01E-04	8.99E-05	4.02E-05
gamma-BHC (Lindane)	0.00110	26.60	2.93E-02	1.852	2.04E-03	0	2.64E-04	8.00	17.9	40.0	3.30E-05	1.48E-05	6.60E-06
gamma-Chlordane	0.07600	4.000	3.04E-01	0.165	1.25E-02	0	2.05E-03	4.58	6.48	9.16	4.48E-04	3.17E-04	2.24E-04
Heptachlor	0.00094	3.000	2.82E-03	0.174	1.64E-04	0	2.43E-05	0.20	0.45	1.00	1.22E-04	5.44E-05	2.43E-05
Heptachlor epoxide	0.00049	10.00	4.90E-03	0.566	2.77E-04	0	3.87E-05	0.20	0.45	1.00	1.93E-04	8.65E-05	3.87E-05
Methoxychlor	0.00480	1.000	4.80E-03	0.525	2.52E-03	0	2.70E-04	4.00	5.66	8.00	6.76E-05	4.78E-05	3.38E-05
Toxaphene	0.99000	1.000	9.90E-01	0.355	3.51E-01	0	3.91E-02	8.00	17.9	40.0	4.89E-03	2.19E-03	9.78E-04

TABLE 7-31

Summary of Meadow Vole Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	0.01200	1.000	1.20E-02	1.000	1.20E-02	0	1.24E-03	76.0	170	380	1.63E-05	7.29E-06	3.26E-06
1,2,4-Trichlorobenzene	0.39000	0.560	2.18E-01	1.426	5.56E-01	0	5.63E-02	53.0	75.0	106	1.06E-03	7.51E-04	5.31E-04
1,2-Dichlorobenzene	0.39000	1.000	3.90E-01	2.452	9.56E-01	0	9.61E-02	85.7	192	429	1.12E-03	5.01E-04	2.24E-04
1,3-Dichlorobenzene	0.39000	1.000	3.90E-01	2.296	8.96E-01	0	9.01E-02	85.7	192	429	1.05E-03	4.70E-04	2.10E-04
1,4-Dichlorobenzene	0.05200	1.000	5.20E-02	2.475	1.29E-01	0	1.29E-02	30.0	52.0	90.0	4.31E-04	2.49E-04	1.44E-04
4-Bromophenyl-phenylether	0.39000	1.000	3.90E-01	0.566	2.21E-01	0	2.35E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	0.39000	1.000	3.90E-01	0.593	2.31E-01	0	2.46E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.16000	0.270	4.32E-02	Regresson	2.24E-02	0	2.70E-03	0.62	1.37	3.07	4.39E-03	1.96E-03	8.79E-04
Benzo(a)pyrene	0.18000	0.340	6.12E-02	Regresson	2.39E-02	0	2.93E-03	0.62	1.37	3.07	4.77E-03	2.13E-03	9.55E-04
Benzo(b)fluoranthene	0.25000	0.210	5.25E-02	0.310	7.75E-02	0	8.37E-03	0.62	1.37	3.07	1.36E-02	6.09E-03	2.73E-03
Benzo(g,h,i)perylene	0.87000	0.150	1.31E-01	Regresson	3.34E-01	0	3.54E-02	0.62	1.37	3.07	5.75E-02	2.58E-02	1.15E-02
Benzo(k)fluoranthene	0.30000	0.210	6.30E-02	Regresson	4.11E-02	0	4.92E-03	0.62	1.37	3.07	8.01E-03	3.58E-03	1.60E-03
Chrysene	0.26000	0.440	1.14E-01	Regresson	2.99E-02	0	3.83E-03	0.62	1.37	3.07	6.23E-03	2.79E-03	1.25E-03
Dibenz(a,h)anthracene	0.04500	0.490	2.21E-02	0.130	5.85E-03	0	7.34E-04	0.62	1.37	3.07	1.19E-03	5.34E-04	2.39E-04
Hexachlorobenzene	0.39000	1.690	6.59E-01	0.246	9.60E-02	0	1.18E-02	2.00	2.83	4.00	5.90E-03	4.17E-03	2.95E-03
Hexachlorobutadiene	0.39000	1.000	3.90E-01	0.675	2.63E-01	0	2.78E-02	2.00	6.32	20.0	1.39E-02	4.39E-03	1.39E-03
Hexachlorocyclopentadiene	0.39000	1.000	3.90E-01	0.393	1.53E-01	0	1.69E-02	75.0	168	375	2.25E-04	1.01E-04	4.50E-05
Hexachloroethane	0.39000	1.000	3.90E-01	1.439	5.61E-01	0	5.72E-02	100	224	500	5.72E-04	2.56E-04	1.14E-04
Indeno(1,2,3-cd)pyrene	0.15000	0.410	6.15E-02	0.110	1.65E-02	0	2.13E-03	0.62	1.37	3.07	3.46E-03	1.55E-03	6.93E-04
Pyrene	0.33000	0.390	1.29E-01	0.720	2.38E-01	0	2.45E-02	0.62	1.37	3.07	3.99E-02	1.78E-02	7.99E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0031 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.020 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.956 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.024 = Proportion of diet composed of soil
WIR = 0.0133 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.0300 = Body weight (kg)

TABLE 7-32

Summary of Short-Tailed Shrew Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	151	Regression	8.34E+00	Regresson	2.31E+00	0	3.77E+00	0.252	0.56	1.26	**1.50E+01**	**6.69E+00**	**2.99E+00**
Cadmium	4.30	Regression	2.64E+01	Regresson	1.38E+00	0	3.17E+00	0.77	2.43	7.70	**4.11E+00**	**1.30E+00**	4.11E-01
Copper	139	Regression	1.96E+01	Regresson	1.36E+01	0	4.94E+00	5.60	7.23	9.34	8.83E-01	6.83E-01	5.29E-01
Lead	46.9	Regression	1.79E+01	Regresson	2.30E+00	0	2.97E+00	4.70	6.47	8.90	6.32E-01	4.60E-01	3.34E-01
Mercury	4.70	20.63	9.69E+01	Regresson	8.57E-01	0	1.14E+01	0.032	0.072	0.16	**3.56E+02**	**1.59E+02**	**7.12E+01**
Selenium	0.78	Regression	7.73E-01	Regresson	3.86E-01	0	1.07E-01	0.20	0.26	0.33	5.36E-01	4.17E-01	3.25E-01
Silver	8.10	15.34	1.24E+02	0.037	2.97E-01	0	1.46E+01	12.0	26.9	60.2	**1.22E+00**	5.44E-01	2.43E-01
Zinc	68.3	Regression	3.42E+02	Regresson	5.04E+01	0	4.15E+01	75.4	169	377	5.50E-01	2.46E-01	1.10E-01
Polychlorinated Biphenyls													
Aroclor-1016	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	5.38E-02	0.136	0.30	0.68	3.95E-01	1.77E-01	7.90E-02
Aroclor-1221	0.39000	Regression	1.14E+00	0.749	2.92E-01	0	1.42E-01	0.136	0.30	0.68	**1.04E+00**	4.66E-01	2.08E-01
Aroclor-1232	0.19000	Regression	4.27E-01	0.515	9.79E-02	0	5.40E-02	0.136	0.30	0.68	3.97E-01	1.78E-01	7.94E-02
Aroclor-1242	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	5.38E-02	0.136	0.30	0.68	3.95E-01	1.77E-01	7.90E-02
Aroclor-1248	0.19000	Regression	4.27E-01	0.184	3.50E-02	0	5.36E-02	0.136	0.30	0.68	3.94E-01	1.76E-01	7.88E-02
Aroclor-1254	0.19000	Regression	4.27E-01	0.139	2.65E-02	0	5.35E-02	0.136	0.30	0.68	3.94E-01	1.76E-01	7.87E-02
Aroclor-1260	0.19000	Regression	4.27E-01	0.105	2.00E-02	0	5.35E-02	0.136	0.30	0.68	3.93E-01	1.76E-01	7.86E-02
Pesticides													
4,4'-DDD	0.03500	Regression	3.08E-01	Regresson	6.51E-03	0	3.66E-02	0.147	0.329	0.735	2.49E-01	1.11E-01	4.98E-02
4,4'-DDT	0.02900	Regression	3.86E-01	Regresson	5.65E-03	0	4.56E-02	0.147	0.329	0.735	3.10E-01	1.39E-01	6.21E-02
Aldrin	0.00047	3.300	1.55E-03	0.139	6.55E-05	0	1.90E-04	0.20	0.45	1.00	9.50E-04	4.25E-04	1.90E-04
alpha-BHC	0.00071	1.000	7.10E-04	1.735	1.23E-03	0	1.04E-04	1.60	2.26	3.20	6.51E-05	4.60E-05	3.25E-05
alpha-Chlordane	0.07400	4.000	2.96E-01	0.165	1.22E-02	0	3.60E-02	4.58	6.48	9.16	7.85E-03	5.55E-03	3.93E-03
beta-BHC	0.00290	1.000	2.90E-03	1.719	4.99E-03	0	4.25E-04	1.60	2.26	3.20	2.66E-04	1.88E-04	1.33E-04
delta-BHC	0.00097	1.000	9.70E-04	1.311	1.27E-03	0	1.39E-04	1.60	2.26	3.20	8.72E-05	6.16E-05	4.36E-05
Dieldrin	0.00660	14.70	9.70E-02	0.410	2.71E-03	0	1.15E-02	0.015	0.021	0.030	7.64E-01	5.40E-01	3.82E-01
Endosulfan I	0.00061	1.000	6.10E-04	1.687	1.03E-03	0	8.92E-05	0.15	0.34	0.75	5.95E-04	2.66E-04	1.19E-04
Endosulfan II	0.00052	1.000	5.20E-04	0.886	4.61E-04	0	7.33E-05	0.15	0.34	0.75	4.89E-04	2.19E-04	9.77E-05
Endrin	0.00059	3.600	2.12E-03	0.535	3.16E-04	0	2.61E-04	0.18	0.41	0.92	1.42E-03	6.34E-04	2.83E-04
gamma-BHC (Lindane)	0.00110	26.60	2.93E-02	1.852	2.04E-03	0	3.45E-03	8.00	17.9	40.0	4.31E-04	1.93E-04	8.62E-05
gamma-Chlordane	0.07600	4.000	3.04E-01	0.165	1.25E-02	0	3.69E-02	4.58	6.48	9.16	8.07E-03	5.70E-03	4.03E-03

TABLE 7-32

Summary of Short-Tailed Shrew Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Heptachlor	0.00094	3.000	2.82E-03	0.174	1.64E-04	0	3.47E-04	0.20	0.45	1.00	1.74E-03	7.77E-04	3.47E-04
Heptachlor epoxide	0.00049	10.00	4.90E-03	0.566	2.77E-04	0	5.82E-04	0.20	0.45	1.00	2.91E-03	1.30E-03	5.82E-04
Methoxychlor	0.00480	1.000	4.80E-03	0.525	2.52E-03	0	6.65E-04	4.00	5.66	8.00	1.66E-04	1.18E-04	8.31E-05
Toxaphene	0.99000	1.000	9.90E-01	0.355	3.51E-01	0	1.36E-01	8.00	17.9	40.0	1.70E-02	7.61E-03	3.40E-03
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	0.01200	1.000	1.20E-02	1.000	1.20E-02	0	1.70E-03	76.0	170	380	2.24E-05	1.00E-05	4.48E-06
1,2,4-Trichlorobenzene	0.39000	0.560	2.18E-01	1.426	5.56E-01	0	3.64E-02	53.0	75.0	106	6.86E-04	4.85E-04	3.43E-04
1,2-Dichlorobenzene	0.39000	1.000	3.90E-01	2.452	9.56E-01	0	5.90E-02	85.7	192	429	6.89E-04	3.08E-04	1.38E-04
1,3-Dichlorobenzene	0.39000	1.000	3.90E-01	2.296	8.96E-01	0	5.86E-02	85.7	192	429	6.84E-04	3.06E-04	1.37E-04
1,4-Dichlorobenzene	0.05200	1.000	5.20E-02	2.475	1.29E-01	0	7.88E-03	30.0	52.0	90.0	2.63E-04	1.52E-04	8.76E-05
4-Bromophenyl-phenylether	0.39000	1.000	3.90E-01	0.566	2.21E-01	0	5.41E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	0.39000	1.000	3.90E-01	0.593	2.31E-01	0	5.42E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.16000	0.270	4.32E-02	Regresson	2.24E-02	0	8.14E-03	0.62	1.37	3.07	1.32E-02	5.92E-03	2.65E-03
Benzo(a)pyrene	0.18000	0.340	6.12E-02	Regresson	2.39E-02	0	1.06E-02	0.62	1.37	3.07	1.73E-02	7.72E-03	3.46E-03
Benzo(b)fluoranthene	0.25000	0.210	5.25E-02	0.310	7.75E-02	0	1.12E-02	0.62	1.37	3.07	1.83E-02	8.18E-03	3.66E-03
Benzo(g,h,i)perylene	0.87000	0.150	1.31E-01	Regresson	3.34E-01	0	3.35E-02	0.62	1.37	3.07	5.44E-02	2.44E-02	1.09E-02
Benzo(k)fluoranthene	0.30000	0.210	6.30E-02	Regresson	4.11E-02	0	1.31E-02	0.62	1.37	3.07	2.14E-02	9.57E-03	4.28E-03
Chrysene	0.26000	0.440	1.14E-01	Regresson	2.99E-02	0	1.83E-02	0.62	1.37	3.07	2.98E-02	1.33E-02	5.97E-03
Dibenz(a,h)anthracene	0.04500	0.490	2.21E-02	0.130	5.85E-03	0	3.44E-03	0.62	1.37	3.07	5.59E-03	2.50E-03	1.12E-03
Hexachlorobenzene	0.39000	1.690	6.59E-01	0.246	9.60E-02	0	8.47E-02	2.00	2.83	4.00	4.24E-02	2.99E-02	2.12E-02
Hexachlorobutadiene	0.39000	1.000	3.90E-01	0.675	2.63E-01	0	5.44E-02	2.00	6.32	20.0	2.72E-02	8.61E-03	2.72E-03
Hexachlorocyclopentadiene	0.39000	1.000	3.90E-01	0.393	1.53E-01	0	5.37E-02	75.0	168	375	7.16E-04	3.20E-04	1.43E-04
Hexachloroethane	0.39000	1.000	3.90E-01	1.439	5.61E-01	0	5.64E-02	100	224	500	5.64E-04	2.52E-04	1.13E-04
Indeno(1,2,3-cd)pyrene	0.15000	0.410	6.15E-02	0.110	1.65E-02	0	1.00E-02	0.62	1.37	3.07	1.63E-02	7.31E-03	3.27E-03
Pyrene	0.33000	0.390	1.29E-01	0.720	2.38E-01	0	2.27E-02	0.62	1.37	3.07	3.69E-02	1.65E-02	7.39E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)

FIR = 0.0019 = Food ingestion rate (kg/day dry weight)

TABLE 7-32

Summary of Short-Tailed Shrew Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ

FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.823 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.047 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.130 = Proportion of diet composed of soil
WIR = 0.0048 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.0133 = Body weight (kg)

TABLE 7-33

Summary of Red Fox Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																	
Arsenic	151	Regression	8.34E+00	Regresson	2.31E+00	Regresson	1.06E+00	Regresson	4.78E-01	0	2.47E-01	1.04	1.31	1.66	2.37E-01	1.88E-01	1.49E-01
Cadmium	4.30	Regression	2.64E+01	Regresson	1.38E+00	Regresson	5.67E-01	Regresson	9.21E+00	0	2.44E-01	0.77	2.43	7.70	3.16E-01	1.00E-01	3.16E-02
Copper	139	Regression	1.96E+01	Regresson	1.36E+01	Regresson	1.57E+01	Regresson	1.98E+01	0	9.73E-01	11.7	13.3	15.1	8.32E-02	7.32E-02	6.45E-02
Lead	46.9	Regression	1.79E+01	Regresson	2.30E+00	Regresson	3.98E+00	Regresson	1.05E+01	0	3.88E-01	4.70	6.47	8.90	8.25E-02	5.99E-02	4.36E-02
Mercury	4.70	20.63	9.69E+01	Regresson	8.57E-01	0.192	9.02E-01	0.192	9.02E-01	0	1.72E-01	0.15	0.19	0.25	**1.15E+00**	8.88E-01	6.88E-01
Selenium	0.78	Regression	7.73E-01	Regresson	3.86E-01	Regresson	6.01E-01	Regresson	6.01E-01	0	2.77E-02	0.20	0.26	0.33	1.39E-01	1.08E-01	8.41E-02
Silver	8.10	15.34	1.24E+02	0.037	2.97E-01	0.007	5.67E-02	0.501	4.06E+00	0	2.57E-01	12.0	26.9	60.2	2.14E-02	9.56E-03	4.27E-03
Zinc	68.3	Regression	3.42E+02	Regresson	5.04E+01	Regresson	1.06E+02	Regresson	1.22E+02	0	5.34E+00	75.4	169	377	7.08E-02	3.17E-02	1.42E-02
Polychlorinated Biphenyls																	
Aroclor-1016	0.19000	Regression	4.27E-01	0.323	6.14E-02	See footnote	7.18E-02	See footnote	3.79E-01	0	1.02E-02	1.37	2.17	3.43	7.43E-03	4.70E-03	2.97E-03
Aroclor-1221	0.39000	Regression	1.14E+00	0.749	2.92E-01	See footnote	3.11E-01	See footnote	1.00E+00	0	2.96E-02	0.138	0.31	0.69	2.15E-01	9.60E-02	4.29E-02
Aroclor-1232	0.19000	Regression	4.27E-01	0.515	9.79E-02	See footnote	1.07E-01	See footnote	3.81E-01	0	1.10E-02	0.138	0.31	0.69	8.01E-02	3.58E-02	1.60E-02
Aroclor-1242	0.19000	Regression	4.27E-01	0.323	6.14E-02	See footnote	7.18E-02	See footnote	3.79E-01	0	1.02E-02	0.138	0.31	0.69	7.38E-02	3.30E-02	1.48E-02
Aroclor-1248	0.19000	Regression	4.27E-01	0.184	3.50E-02	See footnote	4.66E-02	See footnote	3.78E-01	0	9.56E-03	0.14	0.31	0.69	6.83E-02	3.08E-02	1.39E-02
Aroclor-1254	0.19000	Regression	4.27E-01	0.139	2.65E-02	See footnote	3.84E-02	See footnote	3.78E-01	0	9.36E-03	0.14	0.31	0.69	6.68E-02	3.01E-02	1.36E-02
Aroclor-1260	0.19000	Regression	4.27E-01	0.105	2.00E-02	See footnote	3.22E-02	See footnote	3.77E-01	0	9.20E-03	0.14	0.31	0.69	6.57E-02	2.96E-02	1.33E-02
Pesticides																	
4,4'-DDD	0.03500	Regression	3.08E-01	Regresson	6.51E-03	See footnote	1.32E-02	See footnote	2.59E-01	0	6.00E-03	0.147	0.329	0.735	4.08E-02	1.82E-02	8.16E-03
4,4'-DDT	0.02900	Regression	3.86E-01	Regresson	5.65E-03	See footnote	1.38E-02	See footnote	3.22E-01	0	7.39E-03	0.147	0.329	0.735	5.03E-02	2.25E-02	1.01E-02
Aldrin	0.00047	3.300	1.55E-03	0.139	6.55E-05	See footnote	1.05E-04	See footnote	1.34E-03	0	3.23E-05	0.20	0.45	1.00	1.61E-04	7.21E-05	3.23E-05
alpha-BHC	0.00071	1.000	7.10E-04	1.735	1.23E-03	See footnote	1.21E-03	See footnote	7.35E-04	0	4.54E-05	1.60	2.26	3.20	2.84E-05	2.01E-05	1.42E-05
alpha-Chlordane	0.07400	4.000	2.96E-01	0.165	1.22E-02	See footnote	1.94E-02	See footnote	2.54E-01	0	6.08E-03	4.58	6.48	9.16	1.33E-03	9.39E-04	6.64E-04
beta-BHC	0.00290	1.000	2.90E-03	1.719	4.99E-03	See footnote	4.89E-03	See footnote	3.00E-03	0	1.84E-04	1.60	2.26	3.20	1.15E-04	8.15E-05	5.76E-05
delta-BHC	0.00097	1.000	9.70E-04	1.311	1.27E-03	See footnote	1.26E-03	See footnote	9.84E-04	0	5.23E-05	1.60	2.26	3.20	3.27E-05	2.31E-05	1.63E-05
Dieldrin	0.00660	14.70	9.70E-02	0.410	2.71E-03	See footnote	4.69E-03	See footnote	8.08E-02	0	1.88E-03	0.015	0.021	0.030	1.26E-01	8.88E-02	6.28E-02
Endosulfan I	0.00061	1.000	6.10E-04	1.687	1.03E-03	See footnote	1.01E-03	See footnote	6.30E-04	0	3.83E-05	0.15	0.34	0.75	2.56E-04	1.14E-04	5.11E-05
Endosulfan II	0.00052	1.000	5.20E-04	0.886	4.61E-04	See footnote	4.63E-04	See footnote	5.17E-04	0	2.28E-05	0.15	0.34	0.75	1.52E-04	6.80E-05	3.04E-05
Endrin	0.00059	3.600	2.12E-03	0.535	3.16E-04	See footnote	3.58E-04	See footnote	1.84E-03	0	4.93E-05	0.18	0.41	0.92	2.68E-04	1.20E-04	5.36E-05
gamma-BHC (Lindane)	0.00110	26.60	2.93E-02	1.852	2.04E-03	See footnote	2.56E-03	See footnote	2.43E-02	0	5.93E-04	8.00	17.9	40.0	7.41E-05	3.32E-05	1.48E-05
gamma-Chlordane	0.07600	4.000	3.04E-01	0.165	1.25E-02	See footnote	1.99E-02	See footnote	2.61E-01	0	6.24E-03	4.58	6.48	9.16	1.36E-03	9.64E-04	6.82E-04
Heptachlor	0.00094	3.000	2.82E-03	0.174	1.64E-04	See footnote	2.36E-04	See footnote	2.45E-03	0	6.01E-05	0.20	0.45	1.00	3.01E-04	1.34E-04	6.01E-05
Heptachlor epoxide	0.00049	10.00	4.90E-03	0.566	2.77E-04	See footnote	3.75E-04	See footnote	4.11E-03	0	9.92E-05	0.20	0.45	1.00	4.96E-04	2.22E-04	9.92E-05
Methoxychlor	0.00480	1.000	4.80E-03	0.525	2.52E-03	See footnote	2.62E-03	See footnote	4.69E-03	0	1.70E-04	4.00	5.66	8.00	4.24E-05	3.00E-05	2.12E-05
Toxaphene	0.99000	1.000	9.90E-01	0.355	3.51E-01	See footnote	3.79E-01	See footnote	9.60E-01	0	3.10E-02	8.00	17.9	40.0	3.87E-03	1.73E-03	7.74E-04
Volatile/Semivolatile Organics																	
1,1,2,2-Tetrachloroethane	0.01200	1.000	1.20E-02	1.000	1.20E-02	See footnote	1.20E-02	See footnote	1.20E-02	0	5.59E-04	76.0	170	380	7.35E-06	3.29E-06	1.47E-06
1,2,4-Trichlorobenzene	0.39000	0.560	2.18E-01	1.426	5.56E-01	See footnote	5.45E-01	See footnote	2.57E-01	0	1.89E-02	53.0	75.0	106	3.57E-04	2.53E-04	1.79E-04
1,2-Dichlorobenzene	0.39000	1.000	3.90E-01	2.452	9.56E-01	See footnote	9.31E-01	See footnote	4.17E-01	0	3.16E-02	85.7	192	429	3.68E-04	1.65E-04	7.37E-05

TABLE 7-33

Summary of Red Fox Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
1,3-Dichlorobenzene	0.39000	1.000	3.90E-01	2.296	8.96E-01	See footnote	8.73E-01	See footnote	4.14E-01	0	3.01E-02	85.7	192	429	3.52E-04	1.57E-04	7.03E-05
1,4-Dichlorobenzene	0.05200	1.000	5.20E-02	2.475	1.29E-01	See footnote	1.25E-01	See footnote	5.56E-02	0	4.24E-03	30.0	52.0	90.0	1.41E-04	8.15E-05	4.71E-05
4-Bromophenyl-phenylether	0.39000	1.000	3.90E-01	0.566	2.21E-01	See footnote	2.28E-01	See footnote	3.82E-01	0	1.42E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	0.39000	1.000	3.90E-01	0.593	2.31E-01	See footnote	2.38E-01	See footnote	3.83E-01	0	1.44E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.16000	0.270	4.32E-02	Regresson	2.24E-02	0.000	0.00E+00	0.000	0.00E+00	0	3.38E-04	0.62	1.37	3.07	5.50E-04	2.46E-04	1.10E-04
Benzo(a)pyrene	0.18000	0.340	6.12E-02	Regresson	2.39E-02	0.000	0.00E+00	0.000	0.00E+00	0	3.92E-04	0.62	1.37	3.07	6.38E-04	2.86E-04	1.28E-04
Benzo(b)fluoranthene	0.25000	0.210	5.25E-02	0.310	7.75E-02	0.000	0.00E+00	0.000	0.00E+00	0	6.47E-04	0.62	1.37	3.07	1.05E-03	4.71E-04	2.11E-04
Benzo(g,h,i)perylene	0.87000	0.150	1.31E-01	Regresson	3.34E-01	0.000	0.00E+00	0.000	0.00E+00	0	2.39E-03	0.62	1.37	3.07	3.89E-03	1.74E-03	7.80E-04
Benzo(k)fluoranthene	0.30000	0.210	6.30E-02	Regresson	4.11E-02	0.000	0.00E+00	0.000	0.00E+00	0	6.07E-04	0.62	1.37	3.07	9.87E-04	4.42E-04	1.98E-04
Chrysene	0.26000	0.440	1.14E-01	Regresson	2.99E-02	0.000	0.00E+00	0.000	0.00E+00	0	5.86E-04	0.62	1.37	3.07	9.52E-04	4.26E-04	1.91E-04
Dibenz(a,h)anthracene	0.04500	0.490	2.21E-02	0.130	5.85E-03	0.000	0.00E+00	0.000	0.00E+00	0	1.06E-04	0.62	1.37	3.07	1.73E-04	7.75E-05	3.47E-05
Hexachlorobenzene	0.39000	1.690	6.59E-01	0.246	9.60E-02	See footnote	1.14E-01	See footnote	5.98E-01	0	1.62E-02	2.00	2.83	4.00	8.08E-03	5.72E-03	4.04E-03
Hexachlorobutadiene	0.39000	1.000	3.90E-01	0.675	2.63E-01	See footnote	2.69E-01	See footnote	3.84E-01	0	1.52E-02	2.00	6.32	20.0	7.58E-03	2.40E-03	7.58E-04
Hexachlorocyclopentadiene	0.39000	1.000	3.90E-01	0.393	1.53E-01	See footnote	1.64E-01	See footnote	3.79E-01	0	1.26E-02	75.0	168	375	1.67E-04	7.49E-05	3.35E-05
Hexachloroethane	0.39000	1.000	3.90E-01	1.439	5.61E-01	See footnote	5.54E-01	See footnote	3.98E-01	0	2.22E-02	100	224	500	2.22E-04	9.94E-05	4.44E-05
Indeno(1,2,3-cd)pyrene	0.15000	0.410	6.15E-02	0.110	1.65E-02	0.000	0.00E+00	0.000	0.00E+00	0	3.30E-04	0.62	1.37	3.07	5.36E-04	2.40E-04	1.07E-04
Pyrene	0.33000	0.390	1.29E-01	0.720	2.38E-01	0.000	0.00E+00	0.000	0.00E+00	0	1.37E-03	0.62	1.37	3.07	2.23E-03	9.99E-04	4.47E-04

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1476 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.028 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specifi = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 0.874 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.4115 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 3.17 = Body weight (kg)

TABLE 7-34

Summary of American Robin Exposure Doses - Screening (Step 2) - Modeled as an Omnivore

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	151	Regression	8.34E+00	Regresson	2.31E+00	0	1.36E+00	2.24	5.01	11.2	6.09E-01	2.72E-01	1.22E-01
Cadmium	4.30	Regression	2.64E+01	Regresson	1.38E+00	0	1.44E+00	1.47	3.29	7.35	9.78E-01	4.37E-01	1.96E-01
Copper	139	Regression	1.96E+01	Regresson	1.36E+01	0	2.55E+00	4.05	7.00	12.1	6.30E-01	3.65E-01	2.11E-01
Lead	46.9	Regression	1.79E+01	Regresson	2.30E+00	0	1.29E+00	3.85	8.61	19.3	3.36E-01	1.50E-01	6.72E-02
Mercury	4.70	20.63	9.69E+01	Regresson	8.57E-01	0	4.96E+00	0.49	0.77	1.20	**1.01E+01**	**6.47E+00**	**4.14E+00**
Selenium	0.78	Regression	7.73E-01	Regresson	3.86E-01	0	6.64E-02	0.44	0.81	1.50	1.51E-01	8.17E-02	4.42E-02
Silver	8.10	15.34	1.24E+02	0.037	2.97E-01	0	6.33E+00	4.04	9.03	20.2	**1.57E+00**	7.00E-01	3.13E-01
Zinc	68.3	Regression	3.42E+02	Regresson	5.04E+01	0	2.06E+01	66.1	148	331	3.12E-01	1.40E-01	6.24E-02
Polychlorinated Biphenyls													
Aroclor-1016	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	2.62E-02	0.41	0.92	2.05	6.40E-02	2.86E-02	1.28E-02
Aroclor-1221	0.39000	Regression	1.14E+00	0.749	2.92E-01	0	7.70E-02	0.41	0.92	2.05	1.88E-01	8.40E-02	3.75E-02
Aroclor-1232	0.19000	Regression	4.27E-01	0.515	9.79E-02	0	2.84E-02	0.41	0.92	2.05	6.94E-02	3.10E-02	1.39E-02
Aroclor-1242	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	2.62E-02	0.41	0.92	2.05	6.40E-02	2.86E-02	1.28E-02
Aroclor-1248	0.19000	Regression	4.27E-01	0.184	3.50E-02	0	2.47E-02	0.41	0.92	2.05	6.02E-02	2.69E-02	1.20E-02
Aroclor-1254	0.19000	Regression	4.27E-01	0.139	2.65E-02	0	2.41E-02	0.41	0.92	2.05	5.89E-02	2.63E-02	1.18E-02
Aroclor-1260	0.19000	Regression	4.27E-01	0.105	2.00E-02	0	2.38E-02	0.41	0.92	2.05	5.80E-02	2.59E-02	1.16E-02
Pesticides													
4,4'-DDD	0.03500	Regression	3.08E-01	Regresson	6.51E-03	0	1.61E-02	0.50	1.58	5.00	3.22E-02	1.02E-02	3.22E-03
4,4'-DDT	0.02900	Regression	3.86E-01	Regresson	5.65E-03	0	2.00E-02	0.50	1.58	5.00	3.99E-02	1.26E-02	3.99E-03
Aldrin	0.00047	3.300	1.55E-03	0.139	6.55E-05	0	8.46E-05	0.07	0.16	0.35	1.21E-03	5.40E-04	2.41E-04
alpha-BHC	0.00071	1.000	7.10E-04	1.735	1.23E-03	0	1.14E-04	0.56	1.12	2.25	2.03E-04	1.01E-04	5.05E-05
alpha-Chlordane	0.07400	4.000	2.96E-01	0.165	1.22E-02	0	1.61E-02	2.14	4.79	10.7	7.50E-03	3.35E-03	1.50E-03
beta-BHC	0.00290	1.000	2.90E-03	1.719	4.99E-03	0	4.62E-04	0.56	1.12	2.25	8.24E-04	4.11E-04	2.05E-04
delta-BHC	0.00097	1.000	9.70E-04	1.311	1.27E-03	0	1.31E-04	0.56	1.12	2.25	2.33E-04	1.16E-04	5.80E-05
Dieldrin	0.00660	14.70	9.70E-02	0.410	2.71E-03	0	5.09E-03	0.07	0.52	3.78	7.18E-02	9.83E-03	1.35E-03
Endosulfan I	0.00061	1.000	6.10E-04	1.687	1.03E-03	0	9.59E-05	10.0	22.4	50.0	9.59E-06	4.29E-06	1.92E-06
Endosulfan II	0.00052	1.000	5.20E-04	0.886	4.61E-04	0	5.67E-05	10.0	22.4	50.0	5.67E-06	2.54E-06	1.13E-06
Endrin	0.00059	3.600	2.12E-03	0.535	3.16E-04	0	1.29E-04	0.021	0.047	0.104	6.21E-03	2.78E-03	1.24E-03
gamma-BHC (Lindane)	0.00110	26.60	2.93E-02	1.852	2.04E-03	0	1.60E-03	4.00	8.9	20.0	4.01E-04	1.79E-04	8.02E-05
gamma-Chlordane	0.07600	4.000	3.04E-01	0.165	1.25E-02	0	1.65E-02	2.14	4.79	10.7	7.70E-03	3.45E-03	1.54E-03
Heptachlor	0.00094	3.000	2.82E-03	0.174	1.64E-04	0	1.57E-04	0.28	0.62	1.38	5.70E-04	2.55E-04	1.14E-04
Heptachlor epoxide	0.00049	10.00	4.90E-03	0.566	2.77E-04	0	2.66E-04	0.28	0.62	1.38	9.67E-04	4.33E-04	1.93E-04
Methoxychlor	0.00480	1.000	4.80E-03	0.525	2.52E-03	0	4.19E-04	355	794	1,775	1.18E-06	5.28E-07	2.36E-07
Toxaphene	0.99000	1.000	9.90E-01	0.355	3.51E-01	0	7.63E-02	1.00	2.24	5.00	7.63E-02	3.41E-02	1.53E-02

TABLE 7-34

Summary of American Robin Exposure Doses - Screening (Step 2) - Modeled as an Omnivore

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	0.01200	1.000	1.20E-02	1.000	1.20E-02	0	1.39E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.39000	0.560	2.18E-01	1.426	5.56E-01	0	4.65E-02	32.2	71.9	161	1.45E-03	6.47E-04	2.89E-04
1,2-Dichlorobenzene	0.39000	1.000	3.90E-01	2.452	9.56E-01	0	7.93E-02	32.2	71.9	161	2.46E-03	1.10E-03	4.93E-04
1,3-Dichlorobenzene	0.39000	1.000	3.90E-01	2.296	8.96E-01	0	7.56E-02	32.2	71.9	161	2.35E-03	1.05E-03	4.70E-04
1,4-Dichlorobenzene	0.05200	1.000	5.20E-02	2.475	1.29E-01	0	1.06E-02	32.2	71.9	161	3.31E-04	1.48E-04	6.62E-05
4-Bromophenyl-phenylether	0.39000	1.000	3.90E-01	0.566	2.21E-01	0	3.50E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	0.39000	1.000	3.90E-01	0.593	2.31E-01	0	3.56E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.16000	0.270	4.32E-02	Regresson	2.24E-02	0	4.38E-03	7.10	15.9	35.5	6.17E-04	2.76E-04	1.23E-04
Benzo(a)pyrene	0.18000	0.340	6.12E-02	Regresson	2.39E-02	0	5.48E-03	7.10	15.9	35.5	7.72E-04	3.45E-04	1.54E-04
Benzo(b)fluoranthene	0.25000	0.210	5.25E-02	0.310	7.75E-02	0	8.64E-03	7.10	15.9	35.5	1.22E-03	5.44E-04	2.43E-04
Benzo(g,h,i)perylene	0.87000	0.150	1.31E-01	Regresson	3.34E-01	0	3.13E-02	7.10	15.9	35.5	4.41E-03	1.97E-03	8.82E-04
Benzo(k)fluoranthene	0.30000	0.210	6.30E-02	Regresson	4.11E-02	0	7.25E-03	7.10	15.9	35.5	1.02E-03	4.56E-04	2.04E-04
Chrysene	0.26000	0.440	1.14E-01	Regresson	2.99E-02	0	8.96E-03	7.10	15.9	35.5	1.26E-03	5.64E-04	2.52E-04
Dibenz(a,h)anthracene	0.04500	0.490	2.21E-02	0.130	5.85E-03	0	1.70E-03	7.10	15.9	35.5	2.40E-04	1.07E-04	4.80E-05
Hexachlorobenzene	0.39000	1.690	6.59E-01	0.246	9.60E-02	0	4.11E-02	0.113	0.253	0.565	3.64E-01	1.63E-01	7.27E-02
Hexachlorobutadiene	0.39000	1.000	3.90E-01	0.675	2.63E-01	0	3.76E-02	3.39	7.58	17.0	1.11E-02	4.96E-03	2.22E-03
Hexachlorocyclopentadiene	0.39000	1.000	3.90E-01	0.393	1.53E-01	0	3.10E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	0.39000	1.000	3.90E-01	1.439	5.61E-01	0	5.55E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.15000	0.410	6.15E-02	0.110	1.65E-02	0	4.89E-03	7.10	15.9	35.5	6.89E-04	3.08E-04	1.38E-04
Pyrene	0.33000	0.390	1.29E-01	0.720	2.38E-01	0	2.25E-02	7.10	15.9	35.5	3.17E-03	1.42E-03	6.35E-04

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0074 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.435 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.519 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0129 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.0635 = Body weight (kg)

TABLE 7-34a

Summary of American Robin Exposure Doses - Screening (Step 2) - Modeled as an Invertivore

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	151	Regression	8.34E+00	Regresson	2.31E+00	0	1.73E+00	2.24	5.01	11.2	7.71E-01	3.45E-01	1.54E-01
Cadmium	4.30	Regression	2.64E+01	Regresson	1.38E+00	0	2.94E+00	1.47	3.29	7.35	**2.00E+00**	8.95E-01	4.00E-01
Copper	139	Regression	1.96E+01	Regresson	1.36E+01	0	2.91E+00	4.05	7.00	12.1	7.19E-01	4.16E-01	2.41E-01
Lead	46.9	Regression	1.79E+01	Regresson	2.30E+00	0	2.23E+00	3.85	8.61	19.3	5.80E-01	2.60E-01	1.16E-01
Mercury	4.70	20.63	9.69E+01	Regresson	8.57E-01	0	1.07E+01	0.49	0.77	1.20	**2.19E+01**	**1.40E+01**	**8.95E+00**
Selenium	0.78	Regression	7.73E-01	Regresson	3.86E-01	0	8.97E-02	0.44	0.81	1.50	2.04E-01	1.10E-01	5.98E-02
Silver	8.10	15.34	1.24E+02	0.037	2.97E-01	0	1.38E+01	4.04	9.03	20.2	**3.41E+00**	**1.53E+00**	6.82E-01
Zinc	68.3	Regression	3.42E+02	Regresson	5.04E+01	0	3.82E+01	66.1	148	331	5.77E-01	2.58E-01	1.15E-01
Polychlorinated Biphenyls													
Aroclor-1016	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	4.83E-02	0.41	0.92	2.05	1.18E-01	5.26E-02	2.35E-02
Aroclor-1221	0.39000	Regression	1.14E+00	0.749	2.92E-01	0	1.28E-01	0.41	0.92	2.05	3.12E-01	1.39E-01	6.23E-02
Aroclor-1232	0.19000	Regression	4.27E-01	0.515	9.79E-02	0	4.83E-02	0.41	0.92	2.05	1.18E-01	5.26E-02	2.35E-02
Aroclor-1242	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	4.83E-02	0.41	0.92	2.05	1.18E-01	5.26E-02	2.35E-02
Aroclor-1248	0.19000	Regression	4.27E-01	0.184	3.50E-02	0	4.83E-02	0.41	0.92	2.05	1.18E-01	5.26E-02	2.35E-02
Aroclor-1254	0.19000	Regression	4.27E-01	0.139	2.65E-02	0	4.83E-02	0.41	0.92	2.05	1.18E-01	5.26E-02	2.35E-02
Aroclor-1260	0.19000	Regression	4.27E-01	0.105	2.00E-02	0	4.83E-02	0.41	0.92	2.05	1.18E-01	5.26E-02	2.35E-02
Pesticides													
4,4'-DDD	0.03500	Regression	3.08E-01	Regresson	6.51E-03	0	3.43E-02	0.50	1.58	5.00	6.85E-02	2.17E-02	6.85E-03
4,4'-DDT	0.02900	Regression	3.86E-01	Regresson	5.65E-03	0	4.28E-02	0.50	1.58	5.00	8.57E-02	2.71E-02	8.57E-03
Aldrin	0.00047	3.300	1.55E-03	0.139	6.55E-05	0	1.74E-04	0.07	0.16	0.35	2.48E-03	1.11E-03	4.96E-04
alpha-BHC	0.00071	1.000	7.10E-04	1.735	1.23E-03	0	8.23E-05	0.56	1.12	2.25	1.47E-04	7.33E-05	3.66E-05
alpha-Chlordane	0.07400	4.000	2.96E-01	0.165	1.22E-02	0	3.31E-02	2.14	4.79	10.7	1.55E-02	6.92E-03	3.10E-03
beta-BHC	0.00290	1.000	2.90E-03	1.719	4.99E-03	0	3.36E-04	0.56	1.12	2.25	6.00E-04	2.99E-04	1.49E-04
delta-BHC	0.00097	1.000	9.70E-04	1.311	1.27E-03	0	1.12E-04	0.56	1.12	2.25	2.01E-04	1.00E-04	5.00E-05
Dieldrin	0.00660	14.70	9.70E-02	0.410	2.71E-03	0	1.08E-02	0.07	0.52	3.78	1.52E-01	2.08E-02	2.85E-03
Endosulfan I	0.00061	1.000	6.10E-04	1.687	1.03E-03	0	7.07E-05	10.0	22.4	50.0	7.07E-06	3.16E-06	1.41E-06
Endosulfan II	0.00052	1.000	5.20E-04	0.886	4.61E-04	0	6.03E-05	10.0	22.4	50.0	6.03E-06	2.70E-06	1.21E-06
Endrin	0.00059	3.600	2.12E-03	0.535	3.16E-04	0	2.38E-04	0.021	0.047	0.104	1.14E-02	5.12E-03	2.29E-03
gamma-BHC (Lindane)	0.00110	26.60	2.93E-02	1.852	2.04E-03	0	3.24E-03	4.00	8.9	20.0	8.10E-04	3.62E-04	1.62E-04
gamma-Chlordane	0.07600	4.000	3.04E-01	0.165	1.25E-02	0	3.40E-02	2.14	4.79	10.7	1.59E-02	7.11E-03	3.18E-03
Heptachlor	0.00094	3.000	2.82E-03	0.174	1.64E-04	0	3.17E-04	0.28	0.62	1.38	1.15E-03	5.15E-04	2.30E-04
Heptachlor epoxide	0.00049	10.00	4.90E-03	0.566	2.77E-04	0	5.44E-04	0.28	0.62	1.38	1.98E-03	8.84E-04	3.96E-04
Methoxychlor	0.00480	1.000	4.80E-03	0.525	2.52E-03	0	5.56E-04	355	794	1,775	1.57E-06	7.01E-07	3.13E-07
Toxaphene	0.99000	1.000	9.90E-01	0.355	3.51E-01	0	1.15E-01	1.00	2.24	5.00	1.15E-01	5.13E-02	2.29E-02

TABLE 7-34a

Summary of American Robin Exposure Doses - Screening (Step 2) - Modeled as an Invertivore

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	0.01200	1.000	1.20E-02	1.000	1.20E-02	0	1.39E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.39000	0.560	2.18E-01	1.426	5.56E-01	0	2.62E-02	32.2	71.9	161	8.16E-04	3.65E-04	1.63E-04
1,2-Dichlorobenzene	0.39000	1.000	3.90E-01	2.452	9.56E-01	0	4.52E-02	32.2	71.9	161	1.41E-03	6.29E-04	2.81E-04
1,3-Dichlorobenzene	0.39000	1.000	3.90E-01	2.296	8.96E-01	0	4.52E-02	32.2	71.9	161	1.41E-03	6.29E-04	2.81E-04
1,4-Dichlorobenzene	0.05200	1.000	5.20E-02	2.475	1.29E-01	0	6.03E-03	32.2	71.9	161	1.87E-04	8.38E-05	3.75E-05
4-Bromophenyl-phenylether	0.39000	1.000	3.90E-01	0.566	2.21E-01	0	4.52E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	0.39000	1.000	3.90E-01	0.593	2.31E-01	0	4.52E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.16000	0.270	4.32E-02	Regresson	2.24E-02	0	5.63E-03	7.10	15.9	35.5	7.93E-04	3.55E-04	1.59E-04
Benzo(a)pyrene	0.18000	0.340	6.12E-02	Regresson	2.39E-02	0	7.73E-03	7.10	15.9	35.5	1.09E-03	4.87E-04	2.18E-04
Benzo(b)fluoranthene	0.25000	0.210	5.25E-02	0.310	7.75E-02	0	7.14E-03	7.10	15.9	35.5	1.01E-03	4.50E-04	2.01E-04
Benzo(g,h,i)perylene	0.87000	0.150	1.31E-01	Regresson	3.34E-01	0	1.91E-02	7.10	15.9	35.5	2.69E-03	1.20E-03	5.37E-04
Benzo(k)fluoranthene	0.30000	0.210	6.30E-02	Regresson	4.11E-02	0	8.57E-03	7.10	15.9	35.5	1.21E-03	5.40E-04	2.41E-04
Chrysene	0.26000	0.440	1.14E-01	Regresson	2.99E-02	0	1.40E-02	7.10	15.9	35.5	1.98E-03	8.84E-04	3.95E-04
Dibenz(a,h)anthracene	0.04500	0.490	2.21E-02	0.130	5.85E-03	0	2.68E-03	7.10	15.9	35.5	3.77E-04	1.69E-04	7.54E-05
Hexachlorobenzene	0.39000	1.690	6.59E-01	0.246	9.60E-02	0	7.50E-02	0.113	0.253	0.565	6.63E-01	2.97E-01	1.33E-01
Hexachlorobutadiene	0.39000	1.000	3.90E-01	0.675	2.63E-01	0	4.52E-02	3.39	7.58	17.0	1.33E-02	5.96E-03	2.67E-03
Hexachlorocyclopentadiene	0.39000	1.000	3.90E-01	0.393	1.53E-01	0	4.52E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	0.39000	1.000	3.90E-01	1.439	5.61E-01	0	4.52E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.15000	0.410	6.15E-02	0.110	1.65E-02	0	7.60E-03	7.10	15.9	35.5	1.07E-03	4.79E-04	2.14E-04
Pyrene	0.33000	0.390	1.29E-01	0.720	2.38E-01	0	1.60E-02	7.10	15.9	35.5	2.25E-03	1.01E-03	4.50E-04

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0074 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.954 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0129 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.0635 = Body weight (kg)

TABLE 7-35

Summary of Mourning Dove Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	151	Regression	8.34E+00	Regresson	2.31E+00	0	1.94E+00	2.24	5.01	11.2	8.66E-01	3.87E-01	1.73E-01
Cadmium	4.30	Regression	2.64E+01	Regresson	1.38E+00	0	3.03E-01	1.47	3.29	7.35	2.06E-01	9.23E-02	4.13E-02
Copper	139	Regression	1.96E+01	Regresson	1.36E+01	0	3.96E+00	4.05	7.00	12.1	9.79E-01	5.66E-01	3.28E-01
Lead	46.9	Regression	1.79E+01	Regresson	2.30E+00	0	9.01E-01	1.63	2.31	3.26	5.53E-01	3.91E-01	2.76E-01
Mercury	4.70	20.63	9.69E+01	Regresson	8.57E-01	0	2.09E-01	0.45	0.64	0.90	4.64E-01	3.28E-01	2.32E-01
Selenium	0.78	Regression	7.73E-01	Regresson	3.86E-01	0	8.07E-02	0.29	0.41	0.58	2.78E-01	1.97E-01	1.39E-01
Silver	8.10	15.34	1.24E+02	0.037	2.97E-01	0	1.37E-01	4.04	9.03	20.2	3.39E-02	1.51E-02	6.77E-03
Zinc	68.3	Regression	3.42E+02	Regresson	5.04E+01	0	1.02E+01	66.1	148	331	1.54E-01	6.90E-02	3.09E-02
Polychlorinated Biphenyls													
Aroclor-1016	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	1.35E-02	0.36	0.80	1.80	3.75E-02	1.68E-02	7.50E-03
Aroclor-1221	0.39000	Regression	1.14E+00	0.749	2.92E-01	0	5.91E-02	0.36	0.80	1.80	1.64E-01	7.34E-02	3.28E-02
Aroclor-1232	0.19000	Regression	4.27E-01	0.515	9.79E-02	0	2.04E-02	0.36	0.80	1.80	5.67E-02	2.53E-02	1.13E-02
Aroclor-1242	0.19000	Regression	4.27E-01	0.323	6.14E-02	0	1.35E-02	0.36	0.80	1.80	3.75E-02	1.68E-02	7.50E-03
Aroclor-1248	0.19000	Regression	4.27E-01	0.184	3.50E-02	0	8.52E-03	0.36	0.80	1.80	2.37E-02	1.06E-02	4.73E-03
Aroclor-1254	0.19000	Regression	4.27E-01	0.139	2.65E-02	0	6.90E-03	0.36	0.80	1.80	1.92E-02	8.57E-03	3.83E-03
Aroclor-1260	0.19000	Regression	4.27E-01	0.105	2.00E-02	0	5.67E-03	0.36	0.80	1.80	1.58E-02	7.05E-03	3.15E-03
Pesticides													
4,4'-DDD	0.03500	Regression	3.08E-01	Regresson	6.51E-03	0	1.58E-03	0.50	1.58	5.00	3.16E-03	9.99E-04	3.16E-04
4,4'-DDT	0.02900	Regression	3.86E-01	Regresson	5.65E-03	0	1.36E-03	0.50	1.58	5.00	2.71E-03	8.59E-04	2.71E-04
Aldrin	0.00047	3.300	1.55E-03	0.139	6.55E-05	0	1.71E-05	0.07	0.16	0.35	2.43E-04	1.09E-04	4.87E-05
alpha-BHC	0.00071	1.000	7.10E-04	1.735	1.23E-03	0	2.40E-04	0.56	1.12	2.25	4.29E-04	2.14E-04	1.07E-04
alpha-Chlordane	0.07400	4.000	2.96E-01	0.165	1.22E-02	0	3.04E-03	1.19	2.66	5.95	2.56E-03	1.14E-03	5.11E-04
beta-BHC	0.00290	1.000	2.90E-03	1.719	4.99E-03	0	9.72E-04	0.56	1.12	2.25	1.73E-03	8.66E-04	4.32E-04
delta-BHC	0.00097	1.000	9.70E-04	1.311	1.27E-03	0	2.50E-04	0.56	1.12	2.25	4.47E-04	2.23E-04	1.11E-04
Dieldrin	0.00660	14.70	9.70E-02	0.410	2.71E-03	0	5.77E-04	0.07	0.52	3.78	8.14E-03	1.12E-03	1.53E-04
Endosulfan I	0.00061	1.000	6.10E-04	1.687	1.03E-03	0	2.01E-04	10.0	22.4	50.0	2.01E-05	8.98E-06	4.01E-06
Endosulfan II	0.00052	1.000	5.20E-04	0.886	4.61E-04	0	9.23E-05	10.0	22.4	50.0	9.23E-06	4.13E-06	1.85E-06
Endrin	0.00059	3.600	2.12E-03	0.535	3.16E-04	0	6.55E-05	0.021	0.047	0.104	3.15E-03	1.41E-03	6.30E-04
gamma-BHC (Lindane)	0.00110	26.60	2.93E-02	1.852	2.04E-03	0	3.96E-04	4.00	8.9	20.0	9.91E-05	4.43E-05	1.98E-05
gamma-Chlordane	0.07600	4.000	3.04E-01	0.165	1.25E-02	0	3.13E-03	1.19	2.66	5.95	2.63E-03	1.17E-03	5.25E-04
Heptachlor	0.00094	3.000	2.82E-03	0.174	1.64E-04	0	4.03E-05	0.28	0.62	1.38	1.47E-04	6.55E-05	2.93E-05
Heptachlor epoxide	0.00049	10.00	4.90E-03	0.566	2.77E-04	0	5.73E-05	0.28	0.62	1.38	2.08E-04	9.31E-05	4.16E-05
Methoxychlor	0.00480	1.000	4.80E-03	0.525	2.52E-03	0	5.24E-04	355	794	1,775	1.48E-06	6.60E-07	2.95E-07
Toxaphene	0.99000	1.000	9.90E-01	0.355	3.51E-01	0	7.62E-02	1.00	2.24	5.00	7.62E-02	3.41E-02	1.52E-02

TABLE 7-35

Summary of Mourning Dove Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	0.01200	1.000	1.20E-02	1.000	1.20E-02	0	2.39E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.39000	0.560	2.18E-01	1.426	5.56E-01	0	1.09E-01	32.2	71.9	161	3.39E-03	1.52E-03	6.78E-04
1,2-Dichlorobenzene	0.39000	1.000	3.90E-01	2.452	9.56E-01	0	1.85E-01	32.2	71.9	161	5.74E-03	2.57E-03	1.15E-03
1,3-Dichlorobenzene	0.39000	1.000	3.90E-01	2.296	8.96E-01	0	1.73E-01	32.2	71.9	161	5.39E-03	2.41E-03	1.08E-03
1,4-Dichlorobenzene	0.05200	1.000	5.20E-02	2.475	1.29E-01	0	2.49E-02	32.2	71.9	161	7.73E-04	3.46E-04	1.55E-04
4-Bromophenyl-phenylether	0.39000	1.000	3.90E-01	0.566	2.21E-01	0	4.56E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	0.39000	1.000	3.90E-01	0.593	2.31E-01	0	4.76E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.16000	0.270	4.32E-02	Regresson	2.24E-02	0	5.84E-03	7.10	15.9	35.5	8.22E-04	3.68E-04	1.64E-04
Benzo(a)pyrene	0.18000	0.340	6.12E-02	Regresson	2.39E-02	0	6.31E-03	7.10	15.9	35.5	8.89E-04	3.98E-04	1.78E-04
Benzo(b)fluoranthene	0.25000	0.210	5.25E-02	0.310	7.75E-02	0	1.71E-02	7.10	15.9	35.5	2.41E-03	1.08E-03	4.83E-04
Benzo(g,h,i)perylene	0.87000	0.150	1.31E-01	Regresson	3.34E-01	0	7.19E-02	7.10	15.9	35.5	1.01E-02	4.53E-03	2.02E-03
Benzo(k)fluoranthene	0.30000	0.210	6.30E-02	Regresson	4.11E-02	0	1.08E-02	7.10	15.9	35.5	1.51E-03	6.77E-04	3.03E-04
Chrysene	0.26000	0.440	1.14E-01	Regresson	2.99E-02	0	8.25E-03	7.10	15.9	35.5	1.16E-03	5.20E-04	2.32E-04
Dibenz(a,h)anthracene	0.04500	0.490	2.21E-02	0.130	5.85E-03	0	1.55E-03	7.10	15.9	35.5	2.19E-04	9.79E-05	4.38E-05
Hexachlorobenzene	0.39000	1.690	6.59E-01	0.246	9.60E-02	0	2.20E-02	0.113	0.253	0.565	1.95E-01	8.72E-02	3.90E-02
Hexachlorobutadiene	0.39000	1.000	3.90E-01	0.675	2.63E-01	0	5.37E-02	3.39	7.58	17.0	1.58E-02	7.08E-03	3.17E-03
Hexachlorocyclopentadiene	0.39000	1.000	3.90E-01	0.393	1.53E-01	0	3.29E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	0.39000	1.000	3.90E-01	1.439	5.61E-01	0	1.10E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.15000	0.410	6.15E-02	0.110	1.65E-02	0	4.61E-03	7.10	15.9	35.5	6.50E-04	2.91E-04	1.30E-04
Pyrene	0.33000	0.390	1.29E-01	0.720	2.38E-01	0	4.82E-02	7.10	15.9	35.5	6.79E-03	3.04E-03	1.36E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0209 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0175 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.1050 = Body weight (kg)

TABLE 7-36

Summary of Red-tailed Hawk Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																	
Arsenic	151	Regression	8.34E+00	Regresson	2.31E+00	Regresson	1.06E+00	Regresson	4.78E-01	0	3.17E-02	2.24	5.01	11.2	1.42E-02	6.34E-03	2.83E-03
Cadmium	4.30	Regression	2.64E+01	Regresson	1.38E+00	Regresson	5.67E-01	Regresson	9.21E+00	0	2.02E-01	1.47	3.29	7.35	1.37E-01	6.14E-02	2.75E-02
Copper	139	Regression	1.96E+01	Regresson	1.36E+01	Regresson	1.57E+01	Regresson	1.98E+01	0	7.33E-01	4.05	7.00	12.1	1.81E-01	1.05E-01	6.05E-02
Lead	46.9	Regression	1.79E+01	Regresson	2.30E+00	Regresson	3.98E+00	Regresson	1.05E+01	0	3.00E-01	3.85	8.61	19.3	7.79E-02	3.48E-02	1.56E-02
Mercury	4.70	20.63	9.69E+01	Regresson	8.57E-01	0.192	9.02E-01	0.192	9.02E-01	0	3.73E-02	0.49	0.77	1.20	7.61E-02	4.86E-02	3.11E-02
Selenium	0.78	Regression	7.73E-01	Regresson	3.86E-01	Regresson	6.01E-01	Regresson	6.01E-01	0	2.48E-02	0.44	0.81	1.50	5.64E-02	3.05E-02	1.65E-02
Silver	8.10	15.34	1.24E+02	0.037	2.97E-01	0.007	5.67E-02	0.501	4.06E+00	0	8.50E-02	4.04	9.03	20.2	2.10E-02	9.41E-03	4.21E-03
Zinc	68.3	Regression	3.42E+02	Regresson	5.04E+01	Regresson	1.06E+02	Regresson	1.22E+02	0	4.71E+00	66.1	148	331	7.13E-02	3.19E-02	1.43E-02
Polychlorinated Biphenyls																	
Aroclor-1016	0.19000	Regression	4.27E-01	0.323	6.14E-02	See footnote	7.18E-02	See footnote	3.79E-01	0	9.31E-03	0.41	0.92	2.05	2.27E-02	1.02E-02	4.54E-03
Aroclor-1221	0.39000	Regression	1.14E+00	0.749	2.92E-01	See footnote	3.11E-01	See footnote	1.00E+00	0	2.71E-02	0.41	0.92	2.05	6.60E-02	2.95E-02	1.32E-02
Aroclor-1232	0.19000	Regression	4.27E-01	0.515	9.79E-02	See footnote	1.07E-01	See footnote	3.81E-01	0	1.01E-02	0.41	0.92	2.05	2.46E-02	1.10E-02	4.91E-03
Aroclor-1242	0.19000	Regression	4.27E-01	0.323	6.14E-02	See footnote	7.18E-02	See footnote	3.79E-01	0	9.31E-03	0.41	0.92	2.05	2.27E-02	1.02E-02	4.54E-03
Aroclor-1248	0.19000	Regression	4.27E-01	0.184	3.50E-02	See footnote	4.66E-02	See footnote	3.78E-01	0	8.77E-03	0.41	0.92	2.05	2.14E-02	9.56E-03	4.28E-03
Aroclor-1254	0.19000	Regression	4.27E-01	0.139	2.65E-02	See footnote	3.84E-02	See footnote	3.78E-01	0	8.59E-03	0.41	0.92	2.05	2.10E-02	9.37E-03	4.19E-03
Aroclor-1260	0.19000	Regression	4.27E-01	0.105	2.00E-02	See footnote	3.22E-02	See footnote	3.77E-01	0	8.46E-03	0.41	0.92	2.05	2.06E-02	9.22E-03	4.12E-03
Pesticides																	
4,4'-DDD	0.03500	Regression	3.08E-01	Regresson	6.51E-03	See footnote	1.32E-02	See footnote	2.59E-01	0	5.61E-03	0.08	0.18	0.40	7.01E-02	3.14E-02	1.40E-02
4,4'-DDT	0.02900	Regression	3.86E-01	Regresson	5.65E-03	See footnote	1.38E-02	See footnote	3.22E-01	0	6.93E-03	0.08	0.18	0.40	8.66E-02	3.87E-02	1.73E-02
Aldrin	0.00047	3.300	1.55E-03	0.139	6.55E-05	See footnote	1.05E-04	See footnote	1.34E-03	0	2.98E-05	0.07	0.16	0.35	4.26E-04	1.90E-04	8.52E-05
alpha-BHC	0.00071	1.000	7.10E-04	1.735	1.23E-03	See footnote	1.21E-03	See footnote	7.35E-04	0	4.01E-05	0.56	1.12	2.25	7.17E-05	3.58E-05	1.78E-05
alpha-Chlordane	0.07400	4.000	2.96E-01	0.165	1.22E-02	See footnote	1.94E-02	See footnote	2.54E-01	0	5.64E-03	2.14	4.79	10.7	2.64E-03	1.18E-03	5.27E-04
beta-BHC	0.00290	1.000	2.90E-03	1.719	4.99E-03	See footnote	4.89E-03	See footnote	3.00E-03	0	1.63E-04	0.56	1.12	2.25	2.91E-04	1.45E-04	7.24E-05
delta-BHC	0.00097	1.000	9.70E-04	1.311	1.27E-03	See footnote	1.26E-03	See footnote	9.84E-04	0	4.63E-05	0.56	1.12	2.25	8.27E-05	4.13E-05	2.06E-05
Dieldrin	0.00660	14.70	9.70E-02	0.410	2.71E-03	See footnote	4.69E-03	See footnote	8.08E-02	0	1.77E-03	0.07	0.52	3.78	2.49E-02	3.41E-03	4.67E-04
Endosulfan I	0.00061	1.000	6.10E-04	1.687	1.03E-03	See footnote	1.01E-03	See footnote	6.30E-04	0	3.39E-05	10.0	22.4	50.0	3.39E-06	1.51E-06	6.77E-07
Endosulfan II	0.00052	1.000	5.20E-04	0.886	4.61E-04	See footnote	4.63E-04	See footnote	5.17E-04	0	2.02E-05	10.0	22.4	50.0	2.02E-06	9.05E-07	4.05E-07
Endrin	0.00059	3.600	2.12E-03	0.535	3.16E-04	See footnote	3.58E-04	See footnote	1.84E-03	0	4.54E-05	0.021	0.047	0.104	2.18E-03	9.76E-04	4.36E-04
gamma-BHC (Lindane)	0.00110	26.60	2.93E-02	1.852	2.04E-03	See footnote	2.56E-03	See footnote	2.43E-02	0	5.55E-04	4.00	8.9	20.0	1.39E-04	6.21E-05	2.78E-05
gamma-Chlordane	0.07600	4.000	3.04E-01	0.165	1.25E-02	See footnote	1.99E-02	See footnote	2.61E-01	0	5.79E-03	2.14	4.79	10.7	2.71E-03	1.21E-03	5.41E-04
Heptachlor	0.00094	3.000	2.82E-03	0.174	1.64E-04	See footnote	2.36E-04	See footnote	2.45E-03	0	5.55E-05	0.28	0.62	1.38	2.01E-04	9.01E-05	4.03E-05
Heptachlor epoxide	0.00049	10.00	4.90E-03	0.566	2.77E-04	See footnote	3.75E-04	See footnote	4.11E-03	0	9.26E-05	0.28	0.62	1.38	3.36E-04	1.50E-04	6.73E-05
Methoxychlor	0.00480	1.000	4.80E-03	0.525	2.52E-03	See footnote	2.62E-03	See footnote	4.69E-03	0	1.51E-04	355	794	1,775	4.25E-07	1.90E-07	8.51E-08
Toxaphene	0.99000	1.000	9.90E-01	0.355	3.51E-01	See footnote	3.79E-01	See footnote	9.60E-01	0	2.76E-02	1.00	2.24	5.00	2.76E-02	1.24E-02	5.53E-03
Volatile/Semivolatile Organics																	
1,1,2,2-Tetrachloroethane	0.01200	1.000	1.20E-02	1.000	1.20E-02	See footnote	1.20E-02	See footnote	1.20E-02	0	4.96E-04	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.39000	0.560	2.18E-01	1.426	5.56E-01	See footnote	5.45E-01	See footnote	2.57E-01	0	1.66E-02	32.2	71.9	161	5.15E-04	2.30E-04	1.03E-04
1,2-Dichlorobenzene	0.39000	1.000	3.90E-01	2.452	9.56E-01	See footnote	9.31E-01	See footnote	4.17E-01	0	2.78E-02	32.2	71.9	161	8.65E-04	3.87E-04	1.73E-04

TABLE 7-36

Summary of Red-tailed Hawk Exposure Doses - Screening (Step 2)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
1,3-Dichlorobenzene	0.39000	1.000	3.90E-01	2.296	8.96E-01	See footnote	8.73E-01	See footnote	4.14E-01	0	2.66E-02	32.2	71.9	161	8.26E-04	3.70E-04	1.65E-04
1,4-Dichlorobenzene	0.05200	1.000	5.20E-02	2.475	1.29E-01	See footnote	1.25E-01	See footnote	5.56E-02	0	3.74E-03	32.2	71.9	161	1.16E-04	5.19E-05	2.32E-05
4-Bromophenyl-phenylether	0.39000	1.000	3.90E-01	0.566	2.21E-01	See footnote	2.28E-01	See footnote	3.82E-01	0	1.26E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	0.39000	1.000	3.90E-01	0.593	2.31E-01	See footnote	2.38E-01	See footnote	3.83E-01	0	1.28E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.16000	0.270	4.32E-02	Regresson	2.24E-02	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Benzo(a)pyrene	0.18000	0.340	6.12E-02	Regresson	2.39E-02	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Benzo(b)fluoranthene	0.25000	0.210	5.25E-02	0.310	7.75E-02	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	0.87000	0.150	1.31E-01	Regresson	3.34E-01	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.30000	0.210	6.30E-02	Regresson	4.11E-02	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Chrysene	0.26000	0.440	1.14E-01	Regresson	2.99E-02	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Dibenz(a,h)anthracene	0.04500	0.490	2.21E-02	0.130	5.85E-03	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Hexachlorobenzene	0.39000	1.690	6.59E-01	0.246	9.60E-02	See footnote	1.14E-01	See footnote	5.98E-01	0	1.47E-02	0.113	0.253	0.565	1.30E-01	5.82E-02	2.60E-02
Hexachlorobutadiene	0.39000	1.000	3.90E-01	0.675	2.63E-01	See footnote	2.69E-01	See footnote	3.84E-01	0	1.35E-02	3.39	7.58	17.0	3.98E-03	1.78E-03	7.96E-04
Hexachlorocyclopentadiene	0.39000	1.000	3.90E-01	0.393	1.53E-01	See footnote	1.64E-01	See footnote	3.79E-01	0	1.12E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	0.39000	1.000	3.90E-01	1.439	5.61E-01	See footnote	5.54E-01	See footnote	3.98E-01	0	1.97E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.15000	0.410	6.15E-02	0.110	1.65E-02	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Pyrene	0.33000	0.390	1.29E-01	0.720	2.38E-01	0.000	0.00E+00	0.000	0.00E+00	0	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0395 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specifi = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0680 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.957 = Body weight (kg)

TABLE 7-37

Hazard Quotients for Terrestrial Food Web Exposures - Baseline (95% UCL)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			Red Fox			American Robin (omnivore)			American Robin (invertivore			Mourning Dove			Red-tailed Hawk		
	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																					
Arsenic	1.60E-01	7.16E-02	3.20E-02	9.35E-01	4.18E-01	1.87E-01	1.32E-02	1.04E-02	8.26E-03	4.50E-02	2.01E-02	9.00E-03	5.86E-02	2.62E-02	1.17E-02	6.81E-02	3.05E-02	1.36E-02	8.27E-04	3.70E-04	1.65E-04
Cadmium	3.67E-02	1.16E-02	3.67E-03	5.39E-01	1.70E-01	5.39E-02	3.60E-02	1.14E-02	3.60E-03	1.31E-01	5.86E-02	2.62E-02	2.60E-01	1.16E-01	5.19E-02	4.53E-02	2.03E-02	9.07E-03	1.77E-02	7.89E-03	3.53E-03
Mercury	3.04E-01	1.36E-01	6.09E-02	9.57E-01	4.28E-01	1.91E-01	1.01E-02	7.84E-03	6.07E-03	3.96E-02	2.53E-02	1.62E-02	5.23E-02	3.34E-02	2.14E-02	6.14E-02	4.34E-02	3.07E-02	1.34E-03	8.54E-04	5.46E-04
Silver	2.37E-04	1.06E-04	4.74E-05	9.96E-03	4.46E-03	1.99E-03	1.96E-04	8.78E-05	3.93E-05	1.25E-02	5.57E-03	2.49E-03	2.64E-02	1.18E-02	5.28E-03	1.63E-03	7.27E-04	3.25E-04	1.22E-04	5.47E-05	2.44E-05
Polychlorinated Biphenyls																					
Aroclor-1221	9.70E-03	4.34E-03	1.94E-03	2.70E-02	1.21E-02	5.40E-03	7.47E-03	3.34E-03	1.49E-03	5.96E-03	2.67E-03	1.19E-03	7.49E-03	3.35E-03	1.50E-03	1.04E-02	4.64E-03	2.08E-03	2.67E-03	1.20E-03	5.35E-04

Shaded cells indicate HQ > 1

TABLE 7-38

Summary of Meadow Vole Exposure Doses - Baseline (Step 3A) - 95% UCL

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	11.6	Regression	1.37E+00	Regresson	5.44E-01	0	4.04E-02	0.252	0.56	1.26	1.60E-01	7.16E-02	3.20E-02
Cadmium	0.61	Regression	5.57E+00	Regresson	4.73E-01	0	2.82E-02	0.77	2.43	7.70	3.67E-02	1.16E-02	3.67E-03
Mercury	0.305	1.186	3.61E-01	Regresson	1.93E-01	0	9.74E-03	0.032	0.072	0.16	3.04E-01	1.36E-01	6.09E-02
Silver	0.75	2.045	1.53E+00	0.014	1.05E-02	0	2.86E-03	12.0	26.9	60.2	2.37E-04	1.06E-04	4.74E-05
Polychlorinated Biphenyls													
Aroclor-1221	0.03535	Regression	4.33E-02	0.749	2.65E-02	0	1.32E-03	0.136	0.30	0.68	9.70E-03	4.34E-03	1.94E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0021 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.020 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.956 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.024 = Proportion of diet composed of soil
WIR = 0.0090 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.0428 = Body weight (kg)

TABLE 7-39

Summary of Short-Tailed Shrew Exposure Doses - Baseline (Step 3A) - 95% UCL

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	11.6	Regression	1.37E+00	Regresson	5.44E-01	0	2.35E-01	0.252	0.56	1.26	9.35E-01	4.18E-01	1.87E-01
Cadmium	0.61	Regression	5.57E+00	Regresson	4.73E-01	0	4.15E-01	0.77	2.43	7.70	5.39E-01	1.70E-01	5.39E-02
Mercury	0.305	1.186	3.61E-01	Regresson	1.93E-01	0	3.06E-02	0.032	0.072	0.16	9.57E-01	4.28E-01	1.91E-01
Silver	0.75	2.045	1.53E+00	0.014	1.05E-02	0	1.20E-01	12.0	26.9	60.2	9.96E-03	4.46E-03	1.99E-03
Polychlorinated Biphenyls													
Aroclor-1221	0.03535	Regression	4.33E-02	0.749	2.65E-02	0	3.67E-03	0.136	0.30	0.68	2.70E-02	1.21E-02	5.40E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0015 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.823 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.047 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.130 = Proportion of diet composed of soil
WIR = 0.0038 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.0169 = Body weight (kg)

TABLE 7-40

Summary of Red Fox Exposure Doses - Baseline (Step 3A) - 95% UCL

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																	
Arsenic	11.6	Regression	1.37E+00	Regresson	5.44E-01	Regresson	5.72E-02	Regresson	5.85E-02	0	1.37E-02	1.04	1.31	1.66	1.32E-02	1.04E-02	8.26E-03
Cadmium	0.61	Regression	5.57E+00	Regresson	4.73E-01	Regresson	2.25E-01	Regresson	1.40E+00	0	2.77E-02	0.77	2.43	7.70	3.60E-02	1.14E-02	3.60E-03
Mercury	0.305	1.186	3.61E-01	Regresson	1.93E-01	0.067	2.05E-02	0.067	2.05E-02	0	1.52E-03	0.15	0.19	0.25	1.01E-02	7.84E-03	6.07E-03
Silver	0.75	2.045	1.53E+00	0.014	1.05E-02	0.006	4.24E-03	0.036	2.66E-02	0	2.36E-03	12.0	26.9	60.2	1.96E-04	8.78E-05	3.93E-05
Polychlorinated Biphenyls																	
Aroclor-1221	0.03535	Regression	4.33E-02	0.749	2.65E-02	See footnote	2.70E-02	See footnote	4.15E-02	0	1.03E-03	0.138	0.31	0.69	7.47E-03	3.34E-03	1.49E-03

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1231 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.028 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specifi = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 0.874 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.3494 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 4.06 = Body weight (kg)

TABLE 7-41

Summary of American Robin Exposure Doses - Baseline (Step 3A) - 95% UCL - Modeled as an Omnivore

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	11.6	Regression	1.37E+00	Regresson	5.44E-01	0	1.01E-01	2.24	5.01	11.2	4.50E-02	2.01E-02	9.00E-03
Cadmium	0.61	Regression	5.57E+00	Regresson	4.73E-01	0	1.93E-01	1.47	3.29	7.35	1.31E-01	5.86E-02	2.62E-02
Mercury	0.305	1.186	3.61E-01	Regresson	1.93E-01	0	1.94E-02	0.49	0.77	1.20	3.96E-02	2.53E-02	1.62E-02
Silver	0.75	2.045	1.53E+00	0.014	1.05E-02	0	5.04E-02	4.04	9.03	20.2	1.25E-02	5.57E-03	2.49E-03
Polychlorinated Biphenyls													
Aroclor-1221	0.03535	Regression	4.33E-02	0.749	2.65E-02	0	2.44E-03	0.41	0.92	2.05	5.96E-03	2.67E-03	1.19E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0055 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.435 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.519 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0106 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.077 = Body weight (kg)

TABLE 7-41a

Summary of American Robin Exposure Doses - Baseline (Step 3A) - 95% UCL - Modeled as an Invertivore

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	11.6	Regression	1.37E+00	Regresson	5.44E-01	0	1.31E-01	2.24	5.01	11.2	5.86E-02	2.62E-02	1.17E-02
Cadmium	0.61	Regression	5.57E+00	Regresson	4.73E-01	0	3.82E-01	1.47	3.29	7.35	2.60E-01	1.16E-01	5.19E-02
Mercury	0.305	1.186	3.61E-01	Regresson	1.93E-01	0	2.56E-02	0.49	0.77	1.20	5.23E-02	3.34E-02	2.14E-02
Silver	0.75	2.045	1.53E+00	0.014	1.05E-02	0	1.07E-01	4.04	9.03	20.2	2.64E-02	1.18E-02	5.28E-03
Polychlorinated Biphenyls													
Aroclor-1221	0.03535	Regression	4.33E-02	0.749	2.65E-02	0	3.07E-03	0.41	0.92	2.05	7.49E-03	3.35E-03	1.50E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0055 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.954 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0106 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.077 = Body weight (kg)

TABLE 7-42

Summary of Mourning Dove Exposure Doses - Baseline (Step 3A) - 95% UCL

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	11.6	Regression	1.37E+00	Regresson	5.44E-01	0	1.53E-01	2.24	5.01	11.2	6.81E-02	3.05E-02	1.36E-02
Cadmium	0.61	Regression	5.57E+00	Regresson	4.73E-01	0	6.66E-02	1.47	3.29	7.35	4.53E-02	2.03E-02	9.07E-03
Mercury	0.305	1.186	3.61E-01	Regresson	1.93E-01	0	2.76E-02	0.45	0.64	0.90	6.14E-02	4.34E-02	3.07E-02
Silver	0.75	2.045	1.53E+00	0.014	1.05E-02	0	6.57E-03	4.04	9.03	20.2	1.63E-03	7.27E-04	3.25E-04
Polychlorinated Biphenyls													
Aroclor-1221	0.03535	Regression	4.33E-02	0.749	2.65E-02	0	3.74E-03	0.36	0.80	1.80	1.04E-02	4.64E-03	2.08E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0176 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0148 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.1265 = Body weight (kg)

TABLE 7-43

Summary of Red-tailed Hawk Exposure Doses - Baseline (Step 3A) - 95% UCL

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																	
Arsenic	11.6	Regression	1.37E+00	Regresson	5.44E-01	Regresson	5.72E-02	Regresson	5.85E-02	0	1.85E-03	2.24	5.01	11.2	8.27E-04	3.70E-04	1.65E-04
Cadmium	0.61	Regression	5.57E+00	Regresson	4.73E-01	Regresson	2.25E-01	Regresson	1.40E+00	0	2.59E-02	1.47	3.29	7.35	1.77E-02	7.89E-03	3.53E-03
Mercury	0.305	1.186	3.61E-01	Regresson	1.93E-01	0.067	2.05E-02	0.067	2.05E-02	0	6.55E-04	0.49	0.77	1.20	1.34E-03	8.54E-04	5.46E-04
Silver	0.75	2.045	1.53E+00	0.014	1.05E-02	0.006	4.24E-03	0.036	2.66E-02	0	4.94E-04	4.04	9.03	20.2	1.22E-04	5.47E-05	2.44E-05
Polychlorinated Biphenyls																	
Aroclor-1221	0.03535	Regression	4.33E-02	0.749	2.65E-02	See footnote	2.70E-02	See footnote	4.15E-02	0	1.10E-03	0.41	0.92	2.05	2.67E-03	1.20E-03	5.35E-04

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0363 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specifi = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0642 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 1.134 = Body weight (kg)

TABLE 7-44

Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Mean)

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			Red Fox			American Robin (omnivore)			American Robin (invertivore			Mourning Dove			Red-tailed Hawk		
	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																					
Arsenic	1.02E-01	4.58E-02	2.05E-02	5.39E-01	2.41E-01	1.08E-01	7.30E-03	5.78E-03	4.58E-03	2.74E-02	1.23E-02	5.48E-03	3.55E-02	1.59E-02	7.11E-03	4.15E-02	1.85E-02	8.29E-03	4.46E-04	2.00E-04	8.93E-05
Cadmium	3.07E-02	9.72E-03	3.07E-03	4.27E-01	1.35E-01	4.27E-02	2.80E-02	8.85E-03	2.80E-03	1.05E-01	4.68E-02	2.09E-02	2.06E-01	9.21E-02	4.12E-02	3.84E-02	1.72E-02	7.67E-03	1.36E-02	6.09E-03	2.72E-03
Mercury	2.01E-01	9.00E-02	4.02E-02	4.69E-01	2.10E-01	9.39E-02	5.43E-03	4.21E-03	3.26E-03	2.20E-02	1.41E-02	8.98E-03	2.54E-02	1.62E-02	1.04E-02	4.06E-02	2.87E-02	2.03E-02	6.48E-04	4.14E-04	2.65E-04
Silver	1.48E-04	6.62E-05	2.96E-05	6.22E-03	2.78E-03	1.24E-03	1.23E-04	5.48E-05	2.45E-05	7.78E-03	3.48E-03	1.56E-03	1.65E-02	7.37E-03	3.30E-03	1.02E-03	4.54E-04	2.03E-04	7.63E-05	3.41E-05	1.53E-05
Polychlorinated Biphenyls																					
Aroclor-1221	8.03E-03	3.59E-03	1.61E-03	2.11E-02	9.46E-03	4.23E-03	5.99E-03	2.68E-03	1.20E-03	4.77E-03	2.13E-03	9.54E-04	5.82E-03	2.60E-03	1.16E-03	8.61E-03	3.85E-03	1.72E-03	2.14E-03	9.57E-04	4.28E-04

Shaded cells indicate HQ > 1

TABLE 7-45

Summary of Meadow Vole Exposure Doses - Baseline (Step 3A) - Arithmetic Mean

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	6.15	Regression	8.71E-01	Regresson	3.80E-01	0	2.58E-02	0.252	0.56	1.26	1.02E-01	4.58E-02	2.05E-02
Cadmium	0.454	Regression	4.42E+00	Regresson	4.04E-01	0	2.37E-02	0.77	2.43	7.70	3.07E-02	9.72E-03	3.07E-03
Mercury	0.148	1.186	1.75E-01	Regresson	1.31E-01	0	6.44E-03	0.032	0.072	0.16	2.01E-01	9.00E-02	4.02E-02
Silver	0.467	2.045	9.54E-01	0.014	6.53E-03	0	1.78E-03	12.0	26.9	60.2	1.48E-04	6.62E-05	2.96E-05
Polychlorinated Biphenyls													
Aroclor-1221	0.02933	Regression	3.36E-02	0.749	2.20E-02	0	1.09E-03	0.136	0.30	0.68	8.03E-03	3.59E-03	1.61E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0021 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.020 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.956 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.024 = Proportion of diet composed of soil
WIR = 0.0090 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.0428 = Body weight (kg)

TABLE 7-46

Summary of Short-Tailed Shrew Exposure Doses - Baseline (Step 3A) - Arithmetic Mean

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	6.15	Regression	8.71E-01	Regresson	3.80E-01	0	1.36E-01	0.252	0.56	1.26	5.39E-01	2.41E-01	1.08E-01
Cadmium	0.454	Regression	4.42E+00	Regresson	4.04E-01	0	3.29E-01	0.77	2.43	7.70	4.27E-01	1.35E-01	4.27E-02
Mercury	0.148	1.186	1.75E-01	Regresson	1.31E-01	0	1.50E-02	0.032	0.072	0.16	4.69E-01	2.10E-01	9.39E-02
Silver	0.467	2.045	9.54E-01	0.014	6.53E-03	0	7.49E-02	12.0	26.9	60.2	6.22E-03	2.78E-03	1.24E-03
Polychlorinated Biphenyls													
Aroclor-1221	0.02933	Regression	3.36E-02	0.749	2.20E-02	0	2.88E-03	0.136	0.30	0.68	2.11E-02	9.46E-03	4.23E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0015 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.823 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.047 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.130 = Proportion of diet composed of soil
WIR = 0.0038 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.0169 = Body weight (kg)

TABLE 7-47

Summary of Red Fox Exposure Doses - Baseline (Step 3A) - Arithmetic Mean

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																	
Arsenic	6.15	Regression	8.71E-01	Regresson	3.80E-01	Regresson	2.77E-02	Regresson	3.47E-02	0	7.59E-03	1.04	1.31	1.66	7.30E-03	5.78E-03	4.58E-03
Cadmium	0.454	Regression	4.42E+00	Regresson	4.04E-01	Regresson	1.96E-01	Regresson	1.05E+00	0	2.16E-02	0.77	2.43	7.70	2.80E-02	8.85E-03	2.80E-03
Mercury	0.148	1.186	1.75E-01	Regresson	1.31E-01	0.067	9.93E-03	0.067	9.93E-03	0	8.14E-04	0.15	0.19	0.25	5.43E-03	4.21E-03	3.26E-03
Silver	0.467	2.045	9.54E-01	0.014	6.53E-03	0.006	2.65E-03	0.036	1.66E-02	0	1.48E-03	12.0	26.9	60.2	1.23E-04	5.48E-05	2.45E-05
Polychlorinated Biphenyls																	
Aroclor-1221	0.02933	Regression	3.36E-02	0.749	2.20E-02	See footnote	2.24E-02	See footnote	3.25E-02	0	8.27E-04	0.138	0.31	0.69	5.99E-03	2.68E-03	1.20E-03

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1231 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.028 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specifi = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 0.874 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.3494 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 4.06 = Body weight (kg)

TABLE 7-48

Summary of American Robin Exposure Doses - Baseline (Step 3A) - Arithmetic Mean - Modeled as an Omnivore

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	6.15	Regression	8.71E-01	Regresson	3.80E-01	0	6.14E-02	2.24	5.01	11.2	2.74E-02	1.23E-02	5.48E-03
Cadmium	0.454	Regression	4.42E+00	Regresson	4.04E-01	0	1.54E-01	1.47	3.29	7.35	1.05E-01	4.68E-02	2.09E-02
Mercury	0.148	1.186	1.75E-01	Regresson	1.31E-01	0	1.08E-02	0.49	0.77	1.20	2.20E-02	1.41E-02	8.98E-03
Silver	0.467	2.045	9.54E-01	0.014	6.53E-03	0	3.14E-02	4.04	9.03	20.2	7.78E-03	3.48E-03	1.56E-03
Polychlorinated Biphenyls													
Aroclor-1221	0.02933	Regression	3.36E-02	0.749	2.20E-02	0	1.96E-03	0.41	0.92	2.05	4.77E-03	2.13E-03	9.54E-04

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0055 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.435 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.519 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0106 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.077 = Body weight (kg)

TABLE 7-48a

Summary of American Robin Exposure Doses - Baseline (Step 3A) - Arithmetic Mean - Modeled as an Invertivore

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	6.15	Regression	8.71E-01	Regresson	3.80E-01	0	7.96E-02	2.24	5.01	11.2	3.55E-02	1.59E-02	7.11E-03
Cadmium	0.454	Regression	4.42E+00	Regresson	4.04E-01	0	3.03E-01	1.47	3.29	7.35	2.06E-01	9.21E-02	4.12E-02
Mercury	0.148	1.186	1.75E-01	Regresson	1.31E-01	0	1.24E-02	0.49	0.77	1.20	2.54E-02	1.62E-02	1.04E-02
Silver	0.467	2.045	9.54E-01	0.014	6.53E-03	0	6.66E-02	4.04	9.03	20.2	1.65E-02	7.37E-03	3.30E-03
Polychlorinated Biphenyls													
Aroclor-1221	0.02933	Regression	3.36E-02	0.749	2.20E-02	0	2.39E-03	0.41	0.92	2.05	5.82E-03	2.60E-03	1.16E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0055 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.954 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0106 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.077 = Body weight (kg)

TABLE 7-49

Summary of Mourning Dove Exposure Doses - Baseline (Step 3A) - Arithmetic Mean

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	6.15	Regression	8.71E-01	Regresson	3.80E-01	0	9.29E-02	2.24	5.01	11.2	4.15E-02	1.85E-02	8.29E-03
Cadmium	0.454	Regression	4.42E+00	Regresson	4.04E-01	0	5.64E-02	1.47	3.29	7.35	3.84E-02	1.72E-02	7.67E-03
Mercury	0.148	1.186	1.75E-01	Regresson	1.31E-01	0	1.83E-02	0.45	0.64	0.90	4.06E-02	2.87E-02	2.03E-02
Silver	0.467	2.045	9.54E-01	0.014	6.53E-03	0	4.10E-03	4.04	9.03	20.2	1.02E-03	4.54E-04	2.03E-04
Polychlorinated Biphenyls													
Aroclor-1221	0.02933	Regression	3.36E-02	0.749	2.20E-02	0	3.10E-03	0.36	0.80	1.80	8.61E-03	3.85E-03	1.72E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0176 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0148 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 0.1265 = Body weight (kg)

TABLE 7-50

Summary of Red-tailed Hawk Exposure Doses - Baseline (Step 3A) - Arithmetic Mean

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																	
Arsenic	6.15	Regression	8.71E-01	Regresson	3.80E-01	Regresson	2.77E-02	Regresson	3.47E-02	0	1.00E-03	2.24	5.01	11.2	4.46E-04	2.00E-04	8.93E-05
Cadmium	0.454	Regression	4.42E+00	Regresson	4.04E-01	Regresson	1.96E-01	Regresson	1.05E+00	0	2.00E-02	1.47	3.29	7.35	1.36E-02	6.09E-03	2.72E-03
Mercury	0.148	1.186	1.75E-01	Regresson	1.31E-01	0.067	9.93E-03	0.067	9.93E-03	0	3.18E-04	0.49	0.77	1.20	6.48E-04	4.14E-04	2.65E-04
Silver	0.467	2.045	9.54E-01	0.014	6.53E-03	0.006	2.65E-03	0.036	1.66E-02	0	3.08E-04	4.04	9.03	20.2	7.63E-05	3.41E-05	1.53E-05
Polychlorinated Biphenyls																	
Aroclor-1221	0.02933	Regression	3.36E-02	0.749	2.20E-02	See footnote	2.24E-02	See footnote	3.25E-02	0	8.78E-04	0.41	0.92	2.05	2.14E-03	9.57E-04	4.28E-04

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specifi = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0363 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specifi = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specifi = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specifi = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specifi = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0642 = Water ingestion rate (L/day)
WC = Chemical-specifi = Concentration of chemical in water (mg/L)
BW = 1.134 = Body weight (kg)

TABLE 7-51

Reporting Limit to Screening Value Comparison

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Units	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Mean Concentration	ESV	Minimum Ratio	Maximum Ratio	Mean Ratio
Surface Soil									
Thallium	MG/KG	0 / 50	0.84	1.30	0.54	1.00	0.84	1.30	0.54
Toxaphene	UG/KG	0 / 50	89.0	990	73.0	500	0.18	1.98	0.15
4-Nitrophenol	UG/KG	0 / 50	350	940	286	380	0.92	2.47	0.75
Atrazine	UG/KG	0 / 31	94.0	230	95.5	11.9	7.90	19.3	8.03
Subsurface Soil									
Selenium	MG/KG	0 / 14	0.53	0.70	0.29	0.52	1.02	1.35	0.56
Thallium	MG/KG	0 / 14	0.88	1.20	0.53	1.00	0.88	1.20	0.53
Endrin ketone	UG/KG	0 / 13	3.60	4.10	1.88	1.95	1.85	2.10	0.96
4-Nitrophenol	UG/KG	0 / 14	360	1,100	291	380	0.95	2.89	0.77
4,6-Dinitro-2-methylphenol	UG/KG	0 / 14	360	1,100	291	1,000	0.36	1.10	0.29
Atrazine	UG/KG	0 / 9	180	210	96.1	11.9	15.1	17.6	8.08
Groundwater									
Aluminum, total	UG/L	0 / 10	37.9	234	42.5	87.0	0.44	2.69	0.49
Aluminum, dissolved	UG/L	0 / 10	42.8	96.8	34.1	87.0	0.49	1.11	0.39
Copper, total	UG/L	0 / 10	1.20	5.00	1.91	3.73	0.32	1.34	0.51
Silver, total	UG/L	0 / 10	5.00	5.00	2.50	0.23	21.7	21.7	10.9
Silver, dissolved	UG/L	0 / 10	5.00	5.00	2.50	0.23	21.7	21.7	10.9
4,4'-DDD	UG/L	0 / 10	0.10	0.10	0.050	0.025	4.00	4.00	2.00
4,4'-DDT	UG/L	0 / 10	0.10	0.10	0.050	0.0065	15.4	15.4	7.69
alpha-Chlordane	UG/L	0 / 10	0.05	0.05	0.025	0.004	12.5	12.5	6.25
Endosulfan sulfate	UG/L	0 / 10	0.10	0.10	0.050	0.0087	11.5	11.5	5.75
Endrin aldehyde	UG/L	0 / 10	0.006	0.10	0.025	0.01	0.57	10.0	2.49
Endrin ketone	UG/L	0 / 10	0.10	0.10	0.050	0.01	10.0	10.0	5.00
gamma-BHC (Lindane)	UG/L	0 / 10	0.05	0.05	0.025	0.016	3.13	3.13	1.56
Heptachlor	UG/L	0 / 10	0.05	0.05	0.025	0.0036	13.9	13.9	6.94

TABLE 7-51

Reporting Limit to Screening Value Comparison

Site 24 Remedial Investigation Report

Naval Weapons Station Yorktown

Yorktown, Virginia

Chemical	Units	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Mean Concentration	ESV	Minimum Ratio	Maximum Ratio	Mean Ratio
Toxaphene	UG/L	0 / 10	2.50	2.50	1.25	0.21	11.9	11.9	5.95
Aroclor-1016	UG/L	0 / 10	0.93	0.93	0.465	0.03	31.0	31.0	15.5
Aroclor-1221	UG/L	0 / 10	1.30	1.30	0.650	0.03	43.3	43.3	21.7
Aroclor-1232	UG/L	0 / 10	0.93	0.93	0.465	0.03	31.0	31.0	15.5
Aroclor-1242	UG/L	0 / 10	0.63	0.63	0.315	0.03	21.0	21.0	10.5
Aroclor-1248	UG/L	0 / 10	0.63	0.63	0.315	0.03	21.0	21.0	10.5
Aroclor-1254	UG/L	0 / 10	0.63	0.63	0.315	0.03	21.0	21.0	10.5
Aroclor-1260	UG/L	0 / 10	0.93	0.93	0.465	0.03	31.0	31.0	15.5
2-Chloronaphthalene	UG/L	0 / 10	5.00	5.00	2.50	0.40	12.5	12.5	6.25
4,6-Dinitro-2-methylphenol	UG/L	0 / 10	10.0	10.0	5.00	2.30	4.35	4.35	2.17
4-Bromophenyl-phenylether	UG/L	0 / 10	5.00	5.00	2.50	1.50	3.33	3.33	1.67
4-Chloro-3-methylphenol	UG/L	0 / 10	5.00	5.00	2.50	0.30	16.7	16.7	8.33
Anthracene	UG/L	0 / 10	0.20	0.20	0.10	0.18	1.11	1.11	0.56
Benzo(a)anthracene	UG/L	0 / 10	0.20	0.20	0.10	0.027	7.41	7.41	3.70
Benzo(a)pyrene	UG/L	0 / 10	0.20	0.20	0.10	0.014	14.3	14.3	7.14
Di-n-butylphthalate	UG/L	0 / 10	5.00	5.00	2.50	3.40	1.47	1.47	0.74
Hexachlorobenzene	UG/L	0 / 10	5.00	5.00	2.50	3.68	1.36	1.36	0.68
Hexachlorobutadiene	UG/L	0 / 10	5.00	5.00	2.50	0.32	15.6	15.6	7.81
Hexachlorocyclopentadiene	UG/L	0 / 10	5.00	5.00	2.50	0.070	71.4	71.4	35.7
Indeno(1,2,3-cd)pyrene	UG/L	0 / 10	5.00	5.00	2.50	4.31	1.16	1.16	0.58
Pentachlorophenol	UG/L	0 / 10	10.0	10.0	5.00	7.90	1.27	1.27	0.63

Shaded cells indicate ratio > 1

SECTION 8

Conclusions and Recommendations

The following conclusions have been derived from the data presented in this RI, summarized as follows. The current site boundary and status of Site 24 is the result of several activities and investigations from 1994 to present. Site 24 consists of helicopter landing-pad area, six small (each less than 2000 square feet [ft^2]) discontinuous waste disposal areas, and is currently used as a JIEDDO training facility. Previous investigations and this RI included excavation of 74 test pits to delineate waste areas, full suite analysis (target analyte list metals, target compound list organics, and explosives) of 37 surface soil samples, 43 subsurface soil samples, 10 drainage soil samples, and 10 groundwater samples. The extent of waste at the six disposal area as well as the nature extent of soil contamination is well defined. Surface water and sediment are not associated with Site 24.

HHRAs were conducted to quantify potential risks at the site. Human health risks were evaluated for exposures to current receptors (industrial workers and adult and adolescent trespassers/visitors) exposed to surface soil within the waste areas and outside the waste areas. Human health risks were also evaluated for exposures to future receptors (industrial workers, construction worker, adult and child residents, and adolescent trespassers/visitors) exposed to combined surface and subsurface soil both within the waste areas and outside the waste areas. In addition, construction workers were assumed to come into direct contact with shallow groundwater and residents were assumed to be exposed to potable use of shallow and deep groundwater.

Outside the waste disposal areas the results of the HHRA identified no potential unacceptable risk for all media, receptors and exposure pathways, except for potential cancer risks to the future lifetime resident (child + adult) exposed to hexavalent chromium in combined surface and subsurface soil (**Table 8-1**). Site analytical data reflect total chromium. Trivalent chromium is most prevalent in the environment and is expected to reflect the majority of the total chromium concentration. Because trivalent chromium is not considered a potential carcinogen and trivalent chromium is the more prevalent form in the environment, the cancer risks ($2x10^{-4}$) based on hexavalent chromium is a conservative overestimate of risk. Furthermore if the total chromium is assumed to be trivalent the lifetime resident cancer risk is within the USEPA acceptable risk range ($6x10^{-5}$). Additionally, chromium concentrations in soil at Site 24 are consistent with background soils.

Within the waste disposal areas potential unacceptable human health risk is assumed for contact with the waste material by all receptors. There were no potentially unacceptable risks for current receptors exposure to surface soil within the waste disposal areas (industrial workers, construction workers, and child and adult residents). For future land uses, exposure to combined surface and subsurface soil within the waste areas could result in potentially unacceptable risks for the construction worker, child resident, and lifetime resident. There were no potentially unacceptable risks to the future industrial workers, trespassers/visitors, or adult residents. A summary of the estimated risks are presented in **Table 8-1**.

The ERA concluded that for terrestrial habitats, risks for lower trophic level receptors (plants and invertebrates) are generally acceptable on a site-wide basis, particularly given the current and future land use (training facility). However, a few small, isolated areas with high concentrations of mercury (area of sample A06SS-11) and arsenic (area of samples YS24-SS31 and YS24-SS04) in surface soil were identified. In these areas, spatially-limited, localized risks to some lower trophic level receptors may exist. No chemical had a MATC HQ exceeding 1 based upon the 95 percent UCL exposure dose. Thus, risks from terrestrial food web exposures are acceptable.

The results of the risk assessments show that groundwater does not pose unacceptable risk for human or ecological receptors and is not a significant transport medium for site-related constituents to the York River, Felgates Creek, or Indian Field Creek. In addition, while the groundwater from GW11 was not evaluated in the risk assessments, the low level concentrations detected in this monitoring well are not likely to pose potential risk to human health or ecological receptors. As such, the WPNSTA Yorktown Partnering team (including their associated technical support) agreed that no further action was necessary for groundwater (CH2M HILL, 2013).

8.1 Proposed Actions

A remedial action is proposed based on the potential unacceptable risks from exposure to waste materials and soils within the six discontinuous waste disposal areas. In addition, although there is no potential unacceptable human health or ecological risks identified on a site-wide basis, exposure to a small isolated area (A06SS-11) of mercury (4.7 mg/kg) in surface soil adjacent to Disposal Area E could easily be managed during the proposed remedial actions of Disposal Area E. Similarly, although there is no potential unacceptable human health or ecological risks identified on a site-wide basis due to exposure to arsenic, there are two isolated areas of elevated arsenic (YS24-SS04 [70.4 mg/kg] and YS24-SS31 [151 mg/kg]) in surface soil which could also be easily managed during the proposed remedial actions at the site.

While the details of the proposed remedial actions will be submitted under a separate cover, (in the form of an Engineering Estimate/Cost Analysis [EE/CA]), the proposed remedial actions will likely include pre-removal sampling, the removal of waste material and contaminated soil (including removal of the small isolated areas discussed above), and post-removal sampling to confirm cleanup goals were met. Areas considered for future remedial action are shown on **Figure 8-1**.

Table 8-1

Risk Summary for Site Management

Site 24 Remedial Investigation Report

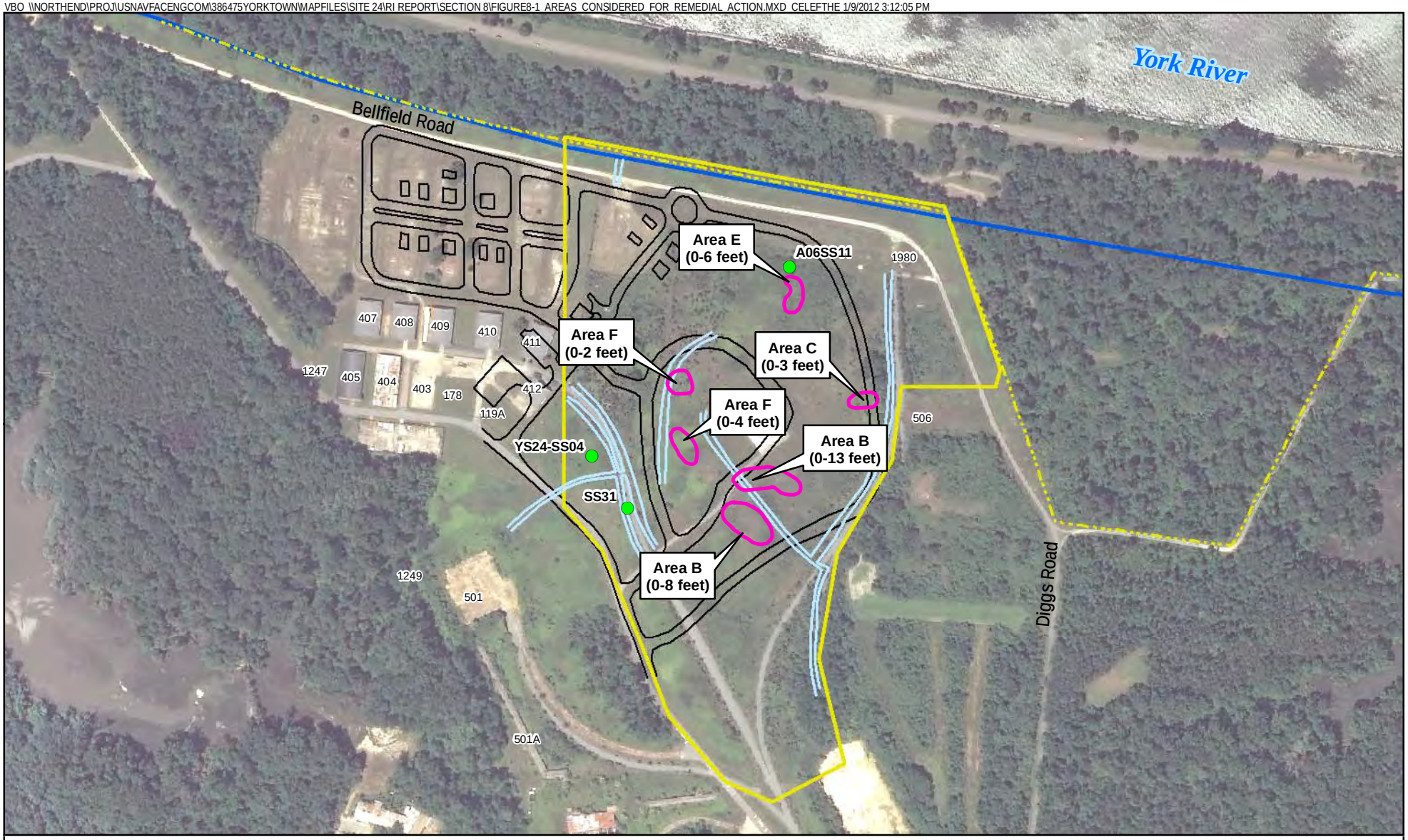
Naval Weapons Station Yorktown

Yorktown, Virginia

Media	Industrial	Construction	Adult Resident	Child Resident	Lifetime Resident
Waste Area Soils	HI<1	Target Organ HI's<1	Target Organ HI's < 1	HI = 21 (Aroclor-1254, Aluminum, Cadmium, and Copper)	N/A
	CR within acceptale range	CR within acceptable range	N/A	N/A	CR = $3x10^{-4}$ (chromium)
Outside Waste Area Soils	HI < 1	HI < 1	HI < 1	HI = 1	N/A
	CR within acceptable range	CR within acceptable range	N/A	N/A	CR = $2x10^{-4}$ (chromium)

HI = Hazard Index
CR = Cancer Risk
*No unacceptable groundwater risks
*No unacceptable risk to risk to tresspasser/visitor

VBO \\NORTHEND\PROJ\USNAVFACENGCOM\386475YORKTOWN\MAPFILES\SITE 24\RI REPORT\SECTION 8\FIGURE8-1_AREAS_CONSIDERED_FOR_REMEDIAL_ACTION.MXD CELEFTHE 1/9/2012 3:12:05 PM



Legend

- Surface Soil Sample Locations (0-6 inches)
- Yorktown Base Boundary
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)
- Waste Disposal Areas
- JIEDDO Battle Course
- Drainage Swales
- Fences

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Figure 8-1
Areas Considered for Remedial Action
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

SECTION 9

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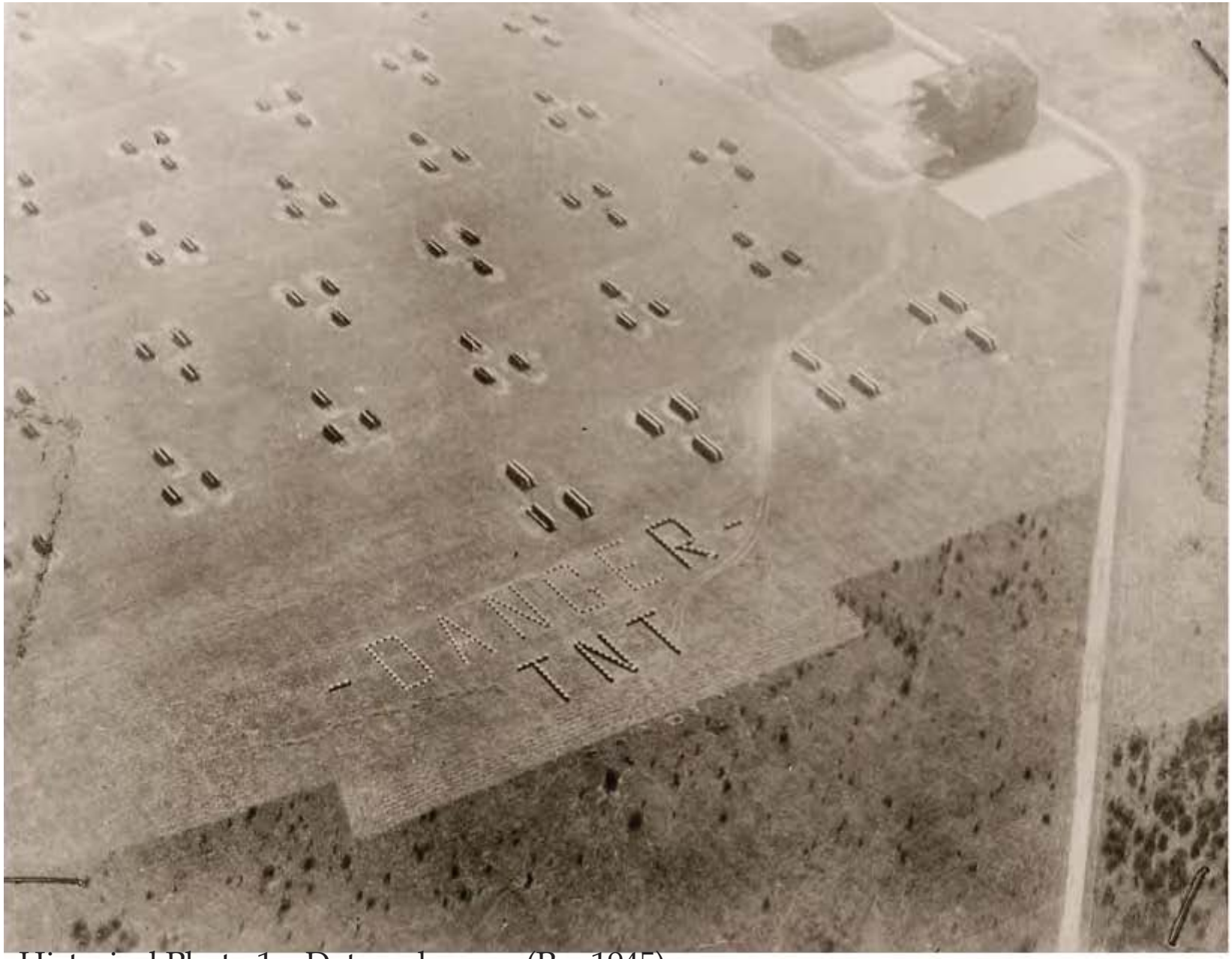
Appendix A
Historical Aerial Photographs



Historical Photo 1 – Date unknown (Pre 1945)

The photograph is believed to have been taken prior to 1945 due to the presence of airplane hangers in the northeast portion of the site. An aerial sign clearly indicates the presence of explosives, however, it is unknown if the items were located or stored in the structures observed in the picture.

Historical Photo 2 – January 21, 1945

The photograph shows the site area following its use as an airfield. Limited storage and ground disturbance is observed.

Historical Photo 3 – March 22, 1951

Little change is observed in the site area between 1945 and 1951.

Historical Photo 4 – June 4, 1963

Ground storage can be observed in the northwest portion of the site. Additionally, some land disturbance is visible in the central portion of the site where the present-day helicopter pad exists.

Historical Photo 5 – March 27, 1968

Increased ground storage can be observed in the northwest portion of the site. Land disturbance is still visible in the central portion of the site where the present-day helicopter pad exists.

Historical Photo 6 – July 27, 1972

Ground storage has decreased in the northern portion of the site, however, there is a notable increase in land disturbance.

Historical Photo 7 – March 26, 1981

Ground storage is no longer present within the site boundary. The site area has been restored and no land disturbance is observed. Additionally, the helicopter pad has been constructed.

Historical Photo 8 – April 4, 1993

Little change is observed in the site area between 1981 and 1993.

Historical Photo 9 – November 1994

Material encountered during trenching activities at Site 24 Aviation Field

Appendix B
Test Pit Logs

CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TP100** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

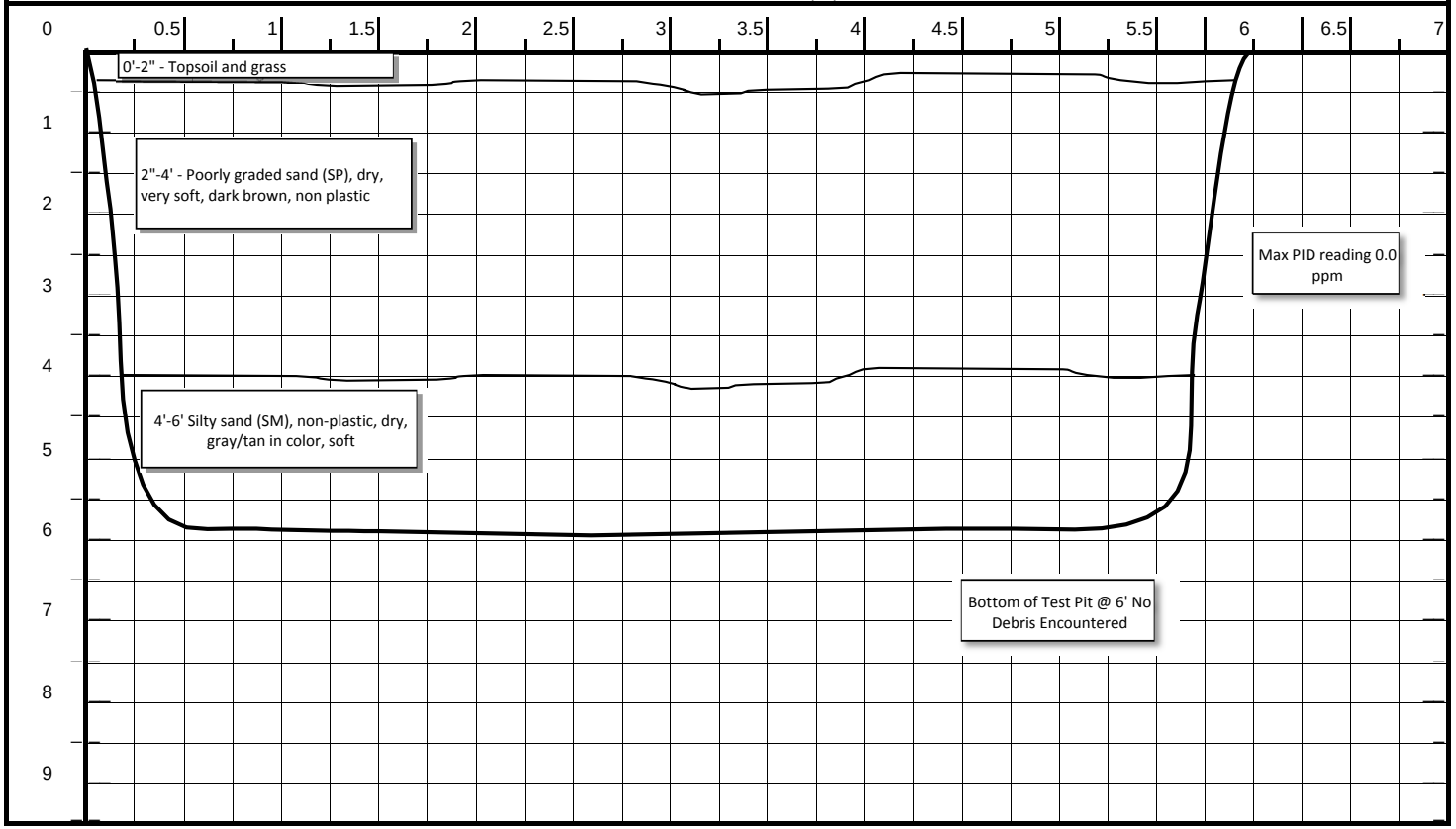
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

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

TEST PIT DIMENSIONS (FT)



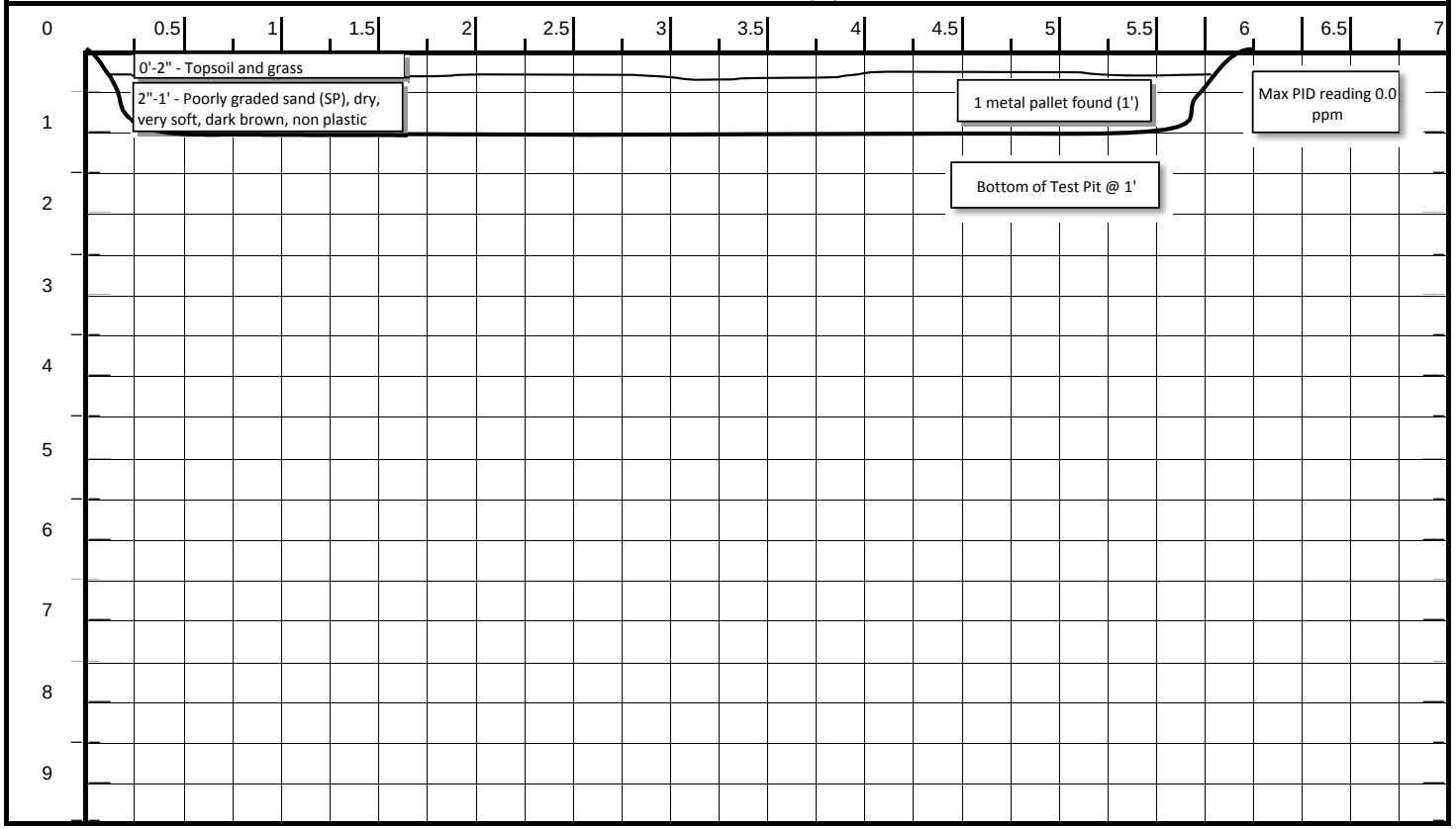
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TP101** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Backhoe Excavator 442		DATE EXCAVATED: 4/20/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 1 ft

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

TEST PIT DIMENSIONS (FT)



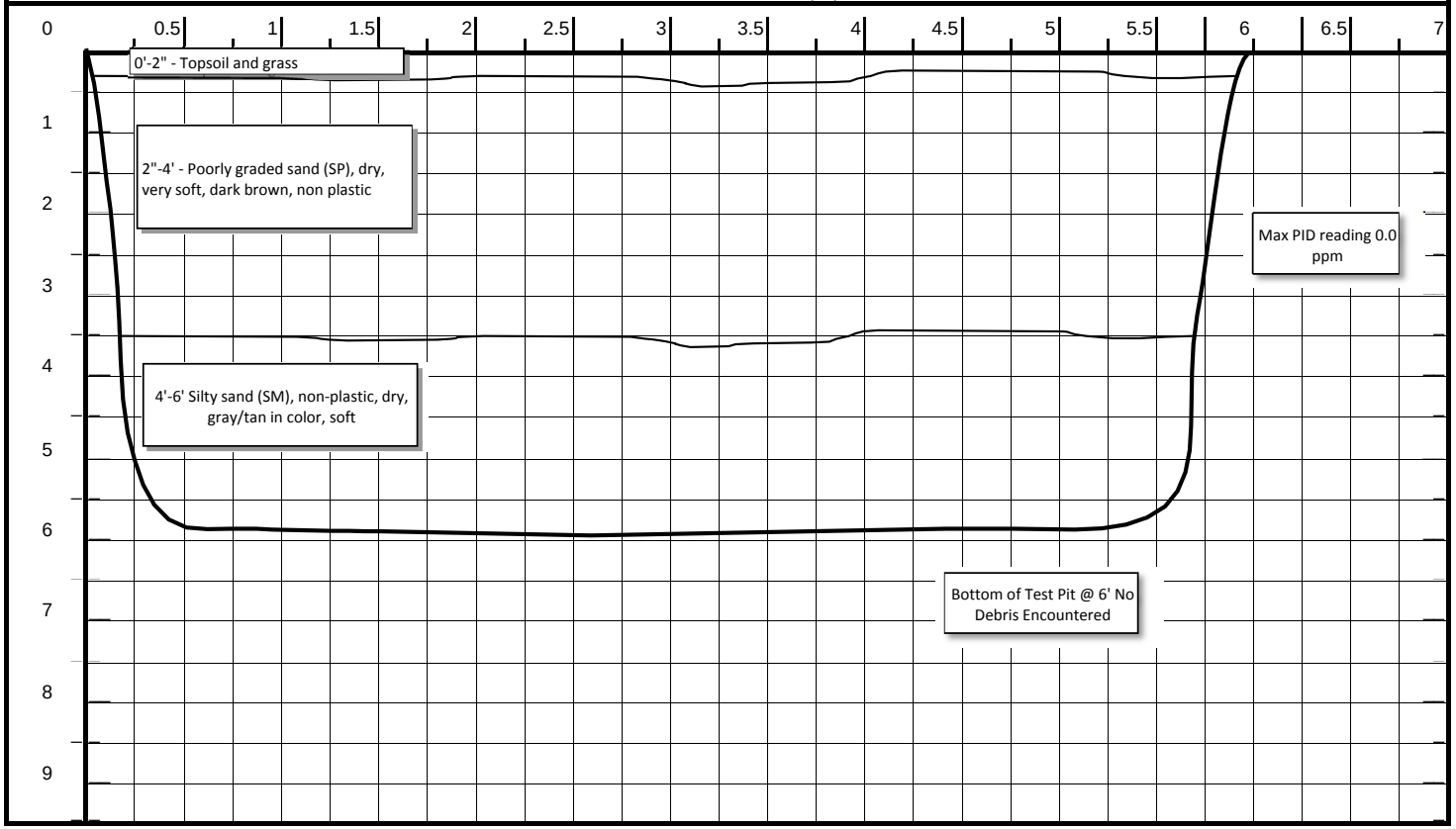
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TP102** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Backhoe Excavator 442		DATE EXCAVATED: 4/20/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP103** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

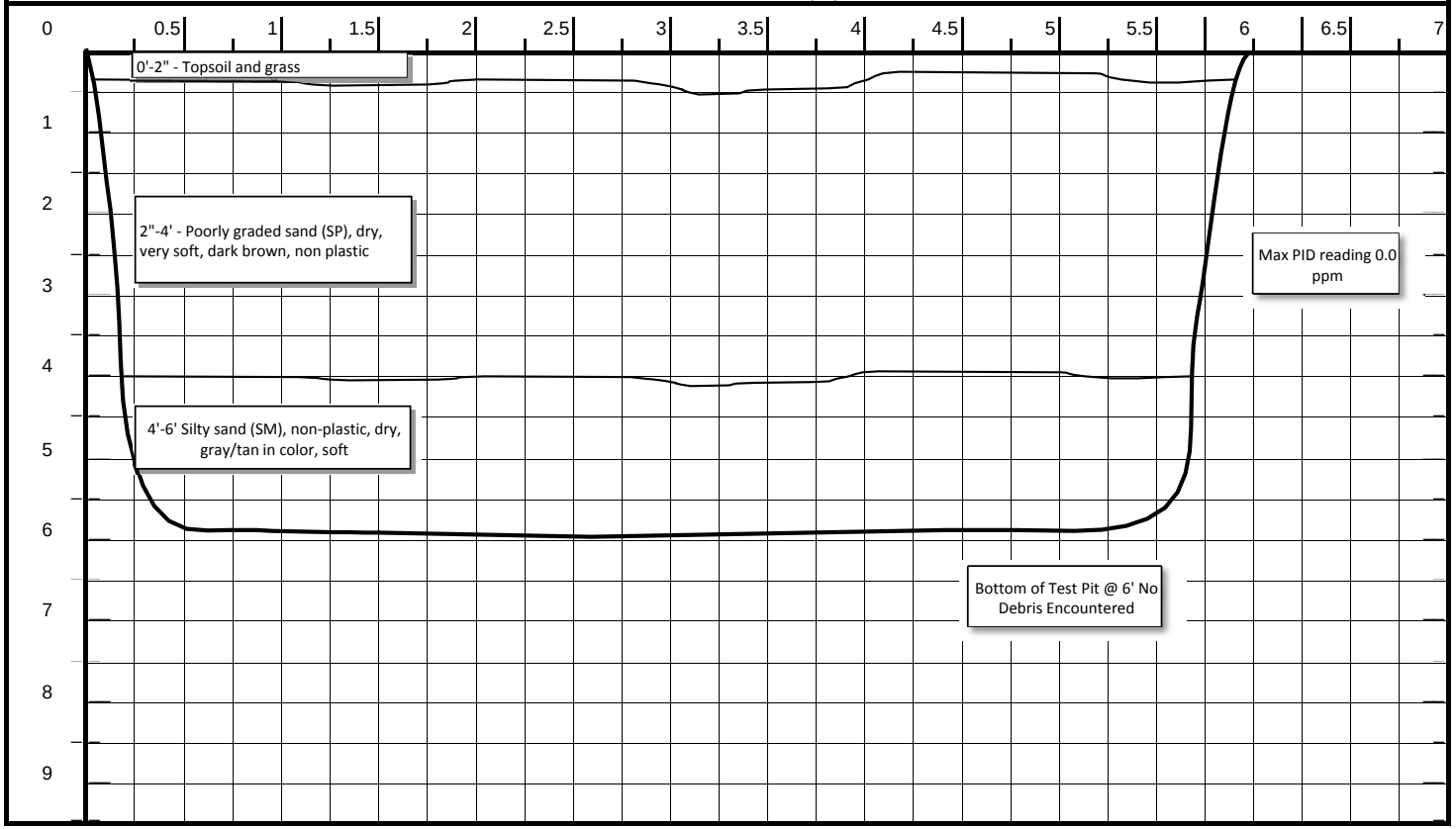
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP104** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

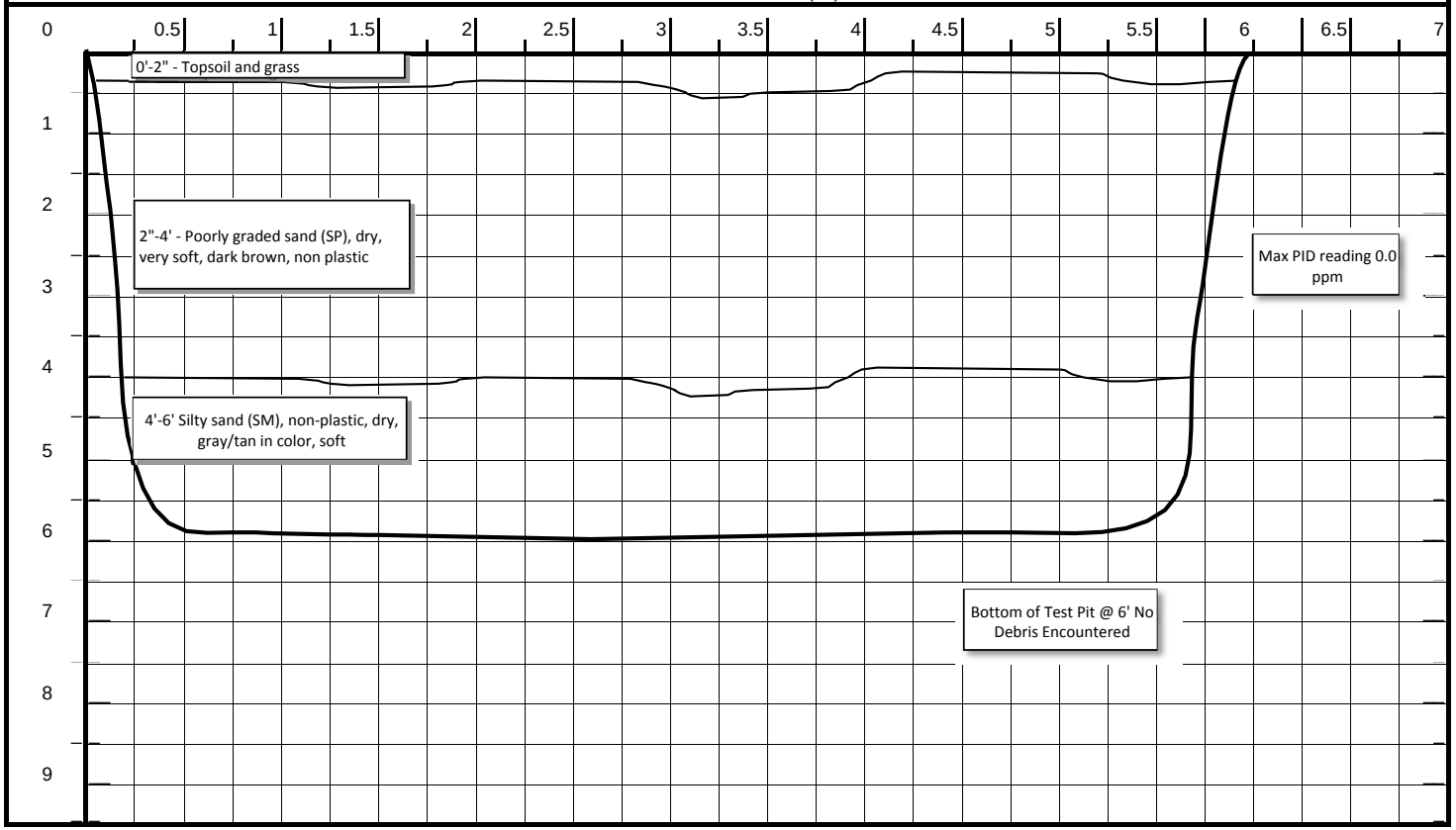
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

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

TEST PIT DIMENSIONS (FT)



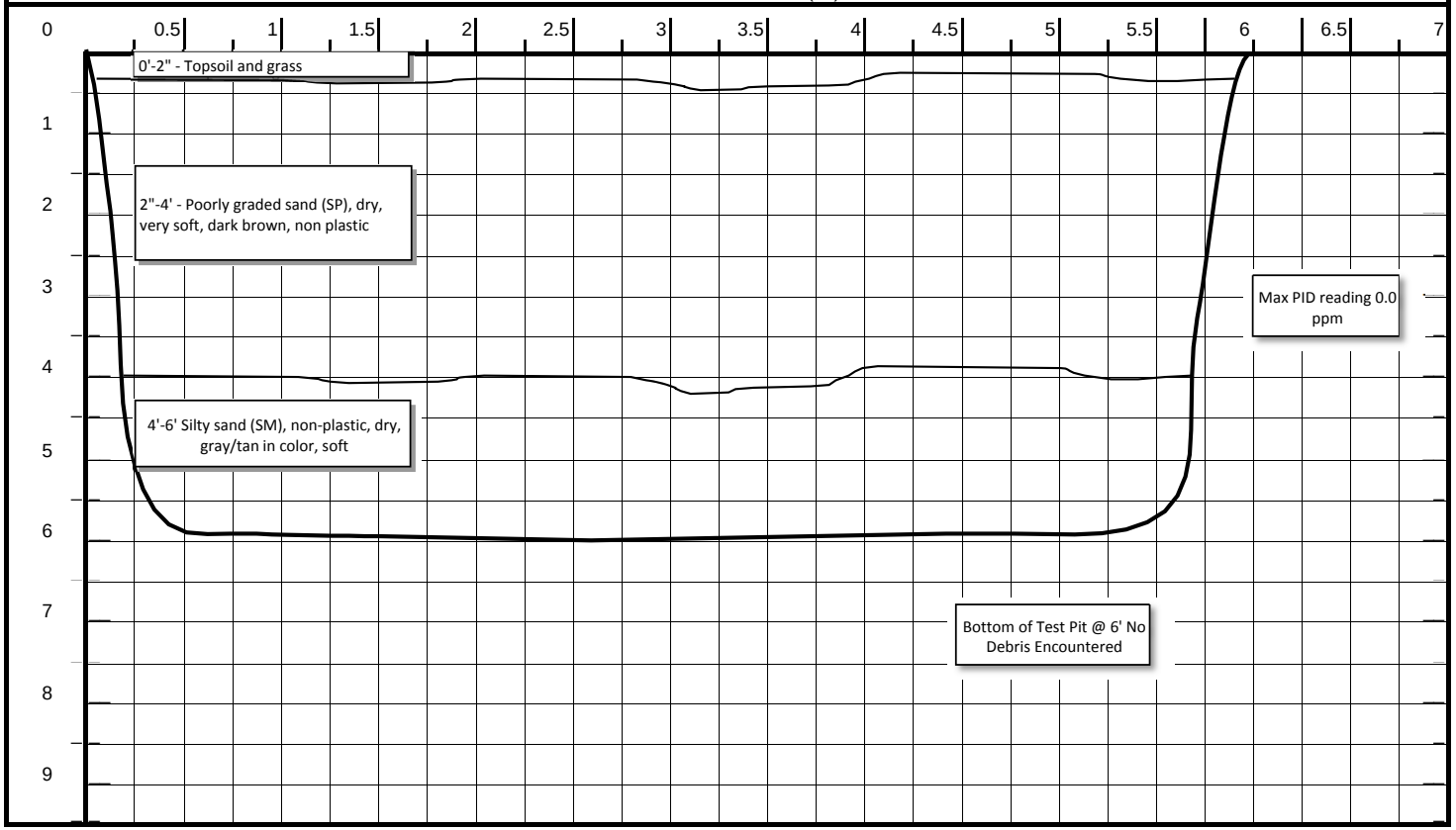
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TP105** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Backhoe Excavator 442		DATE EXCAVATED: 4/20/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP106** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

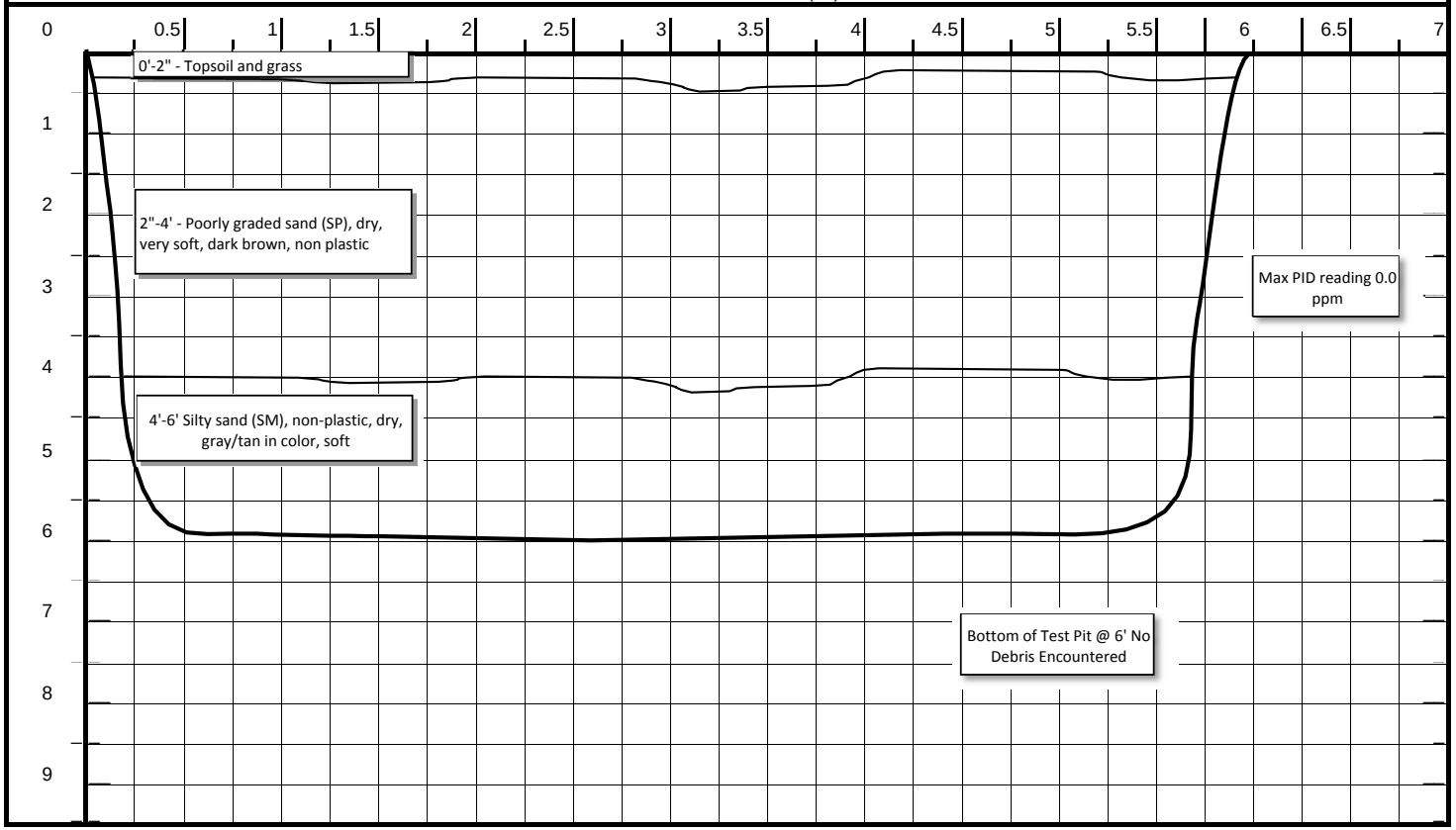
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP107** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

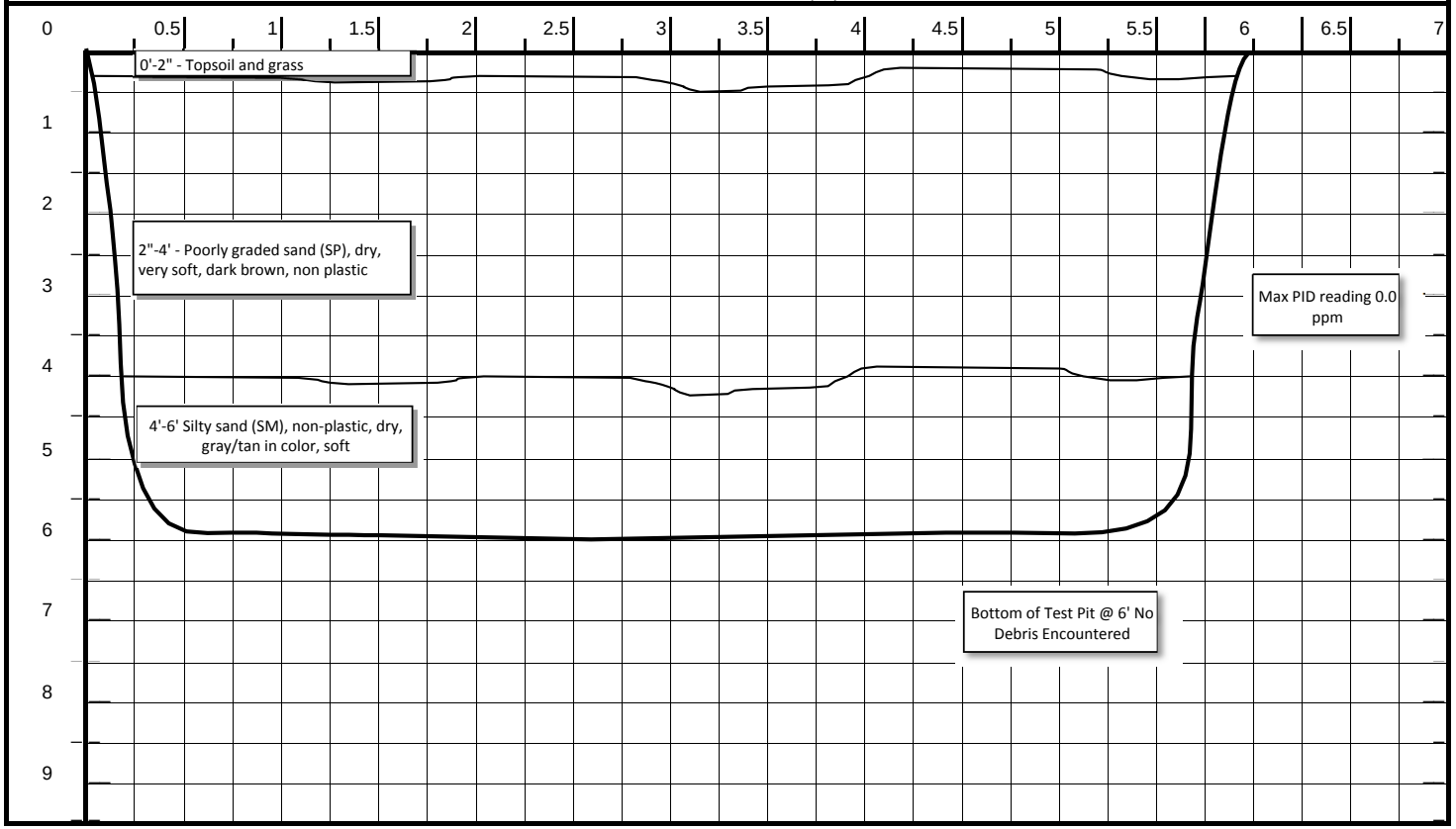
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP108** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

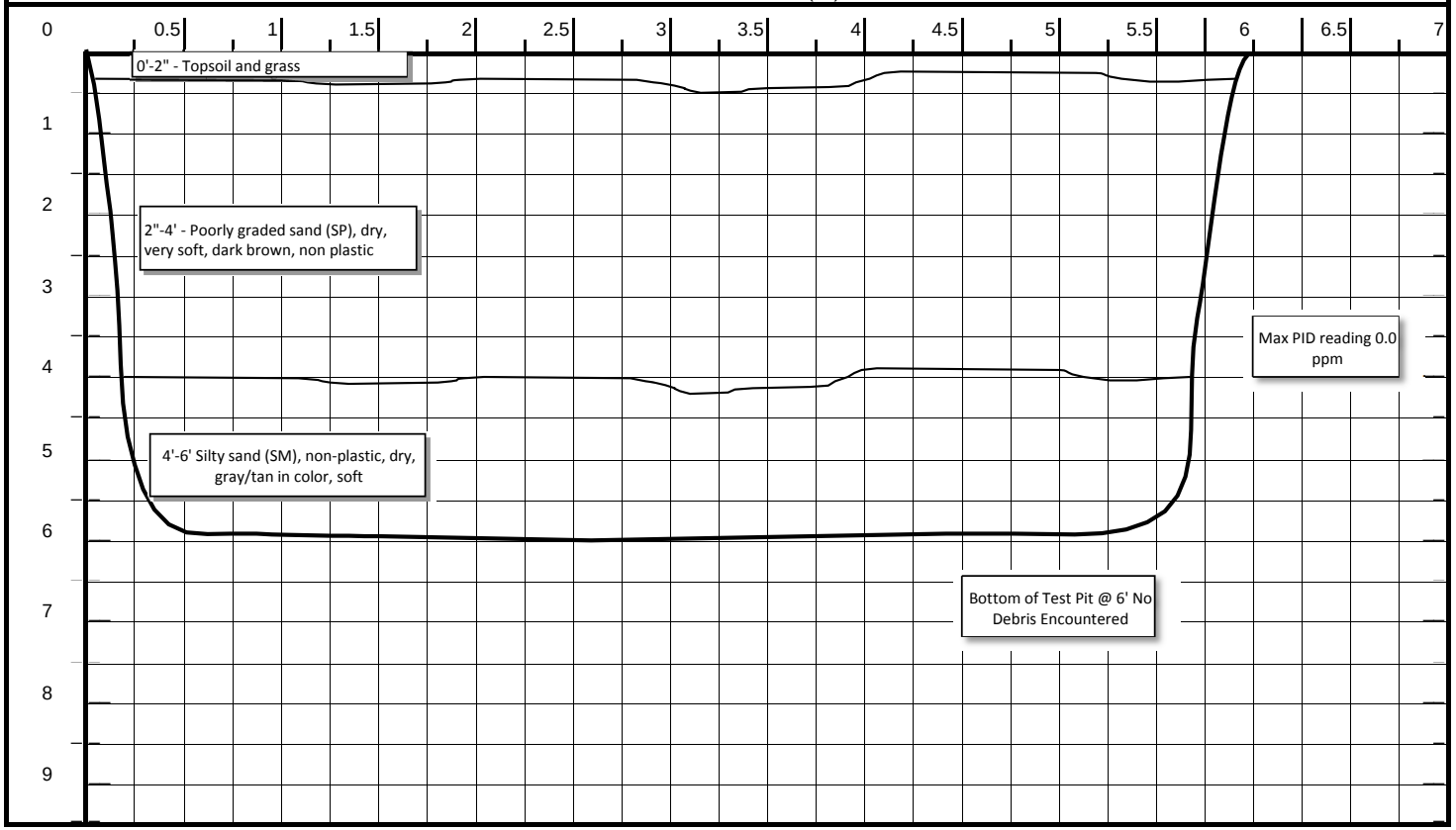
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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 364428.FI.FS	TEST PIT NUMBER TP109 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

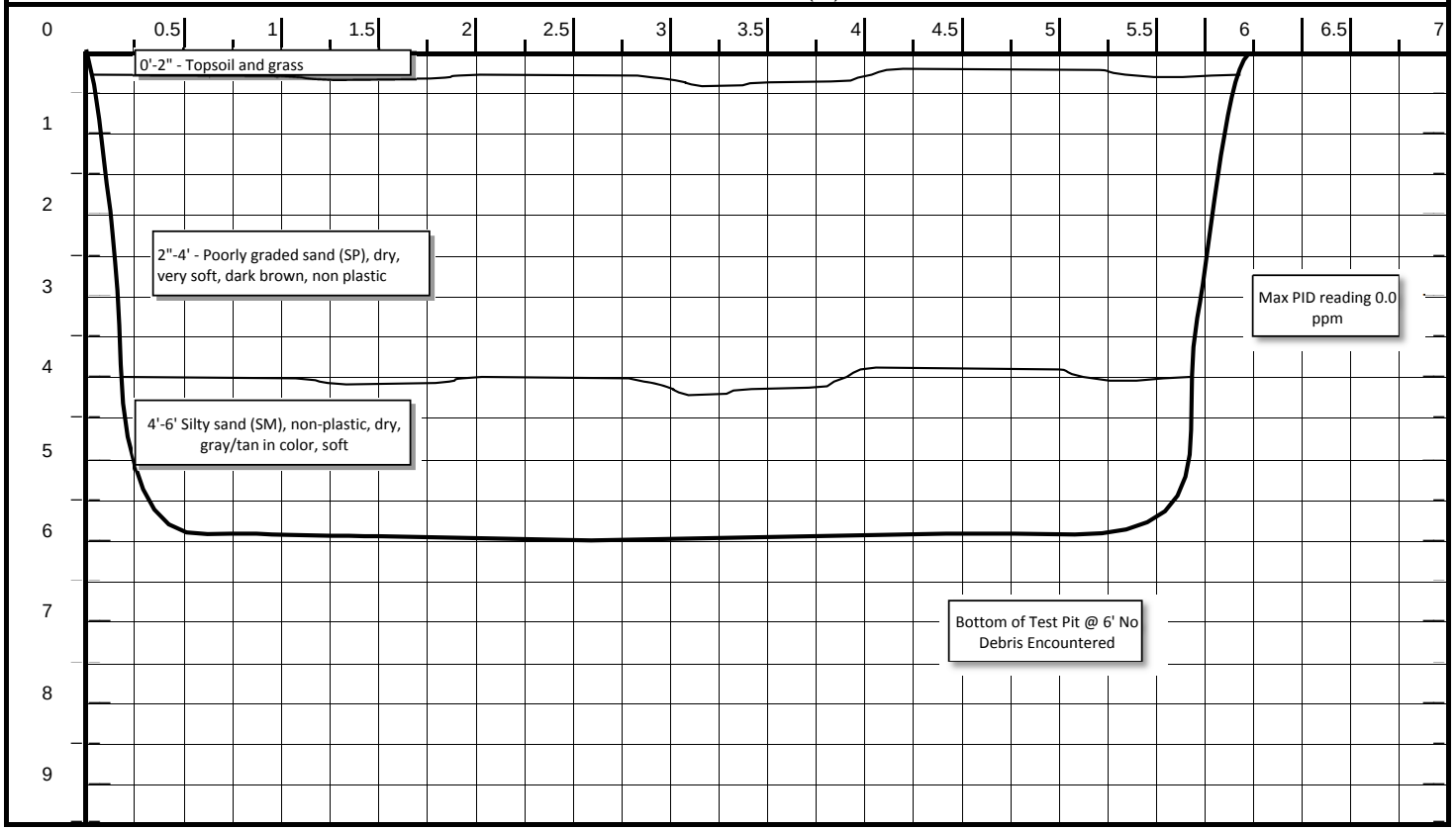
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP110** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

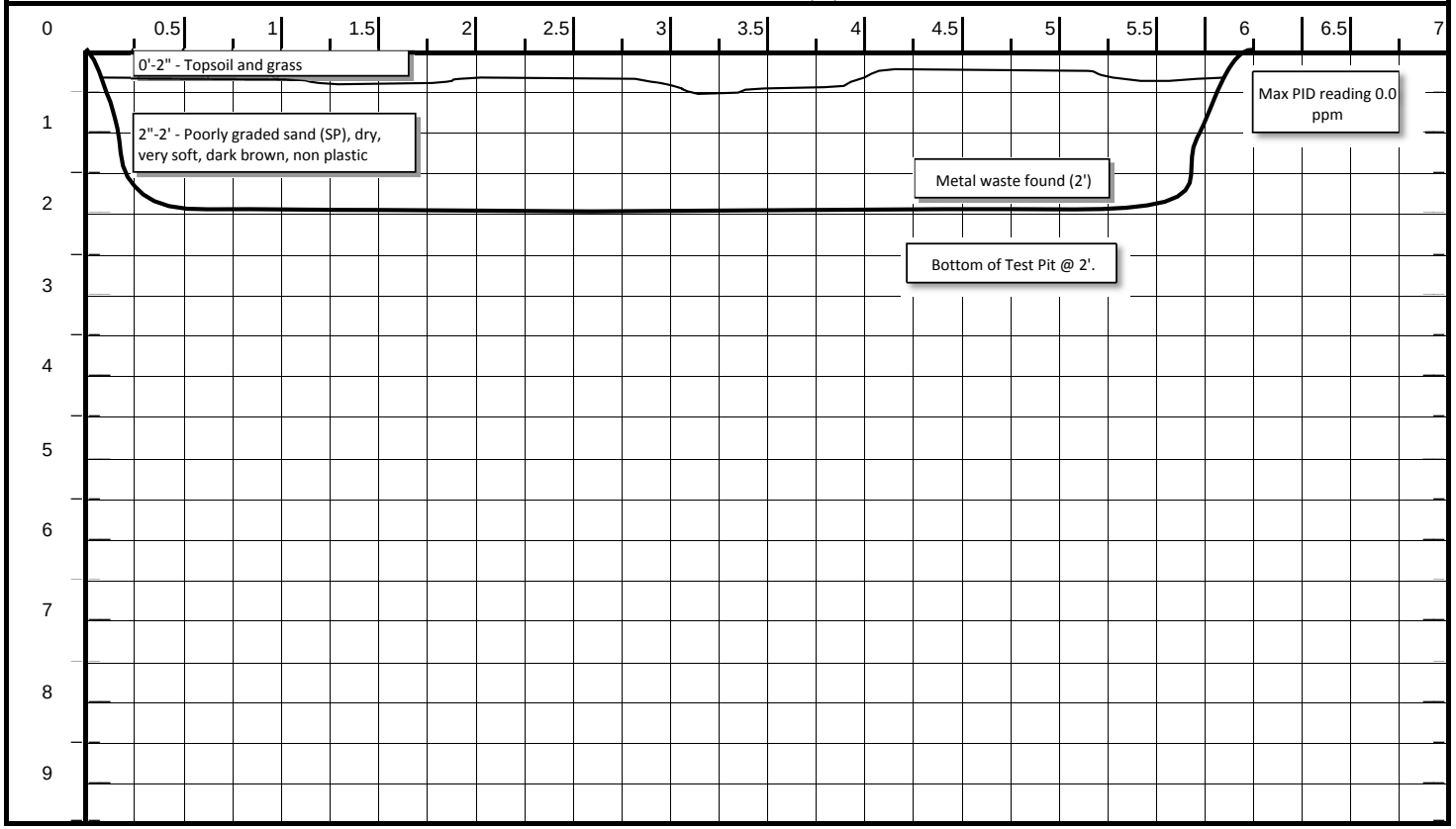
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 2 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP111** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

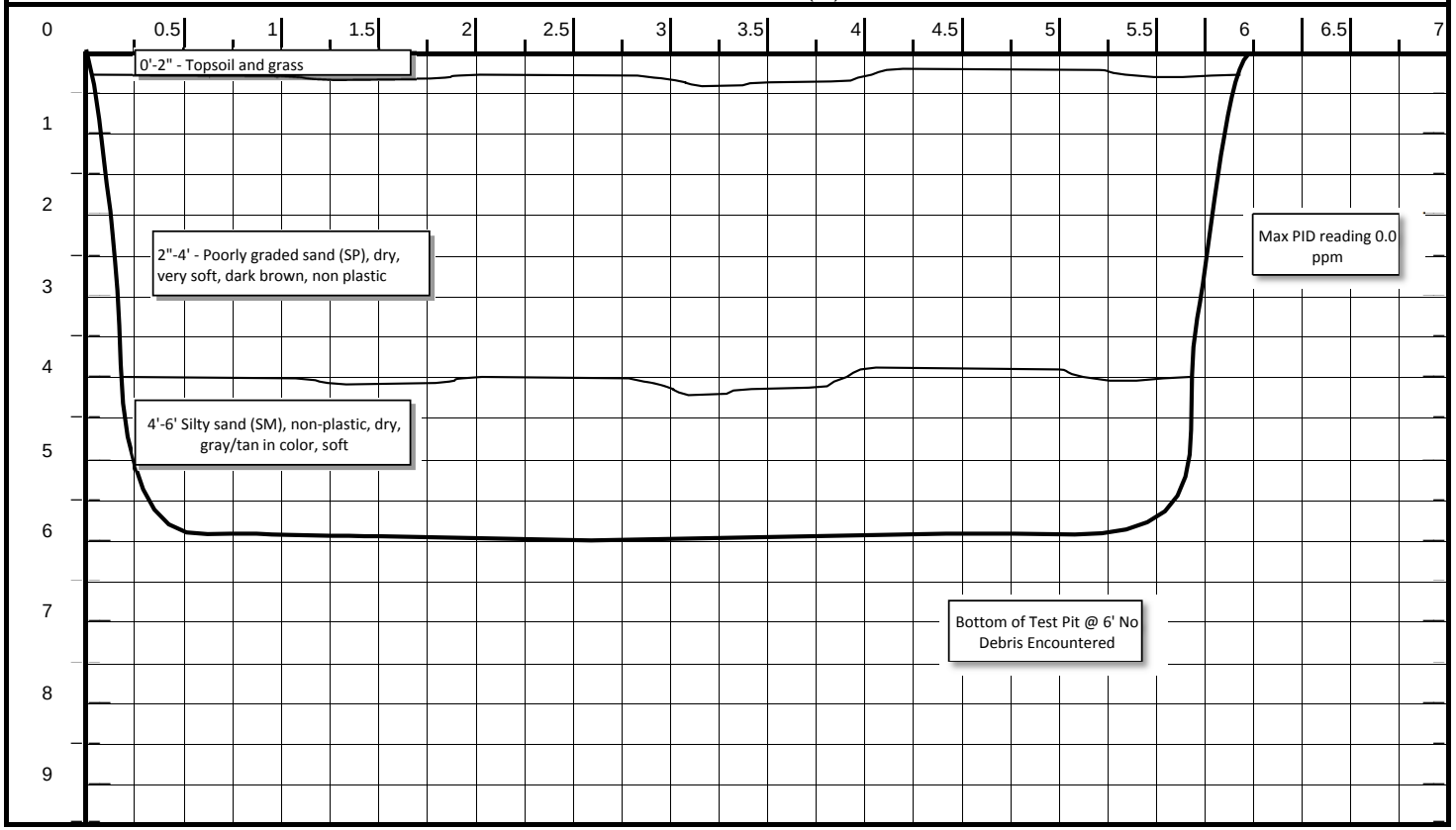
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP112** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

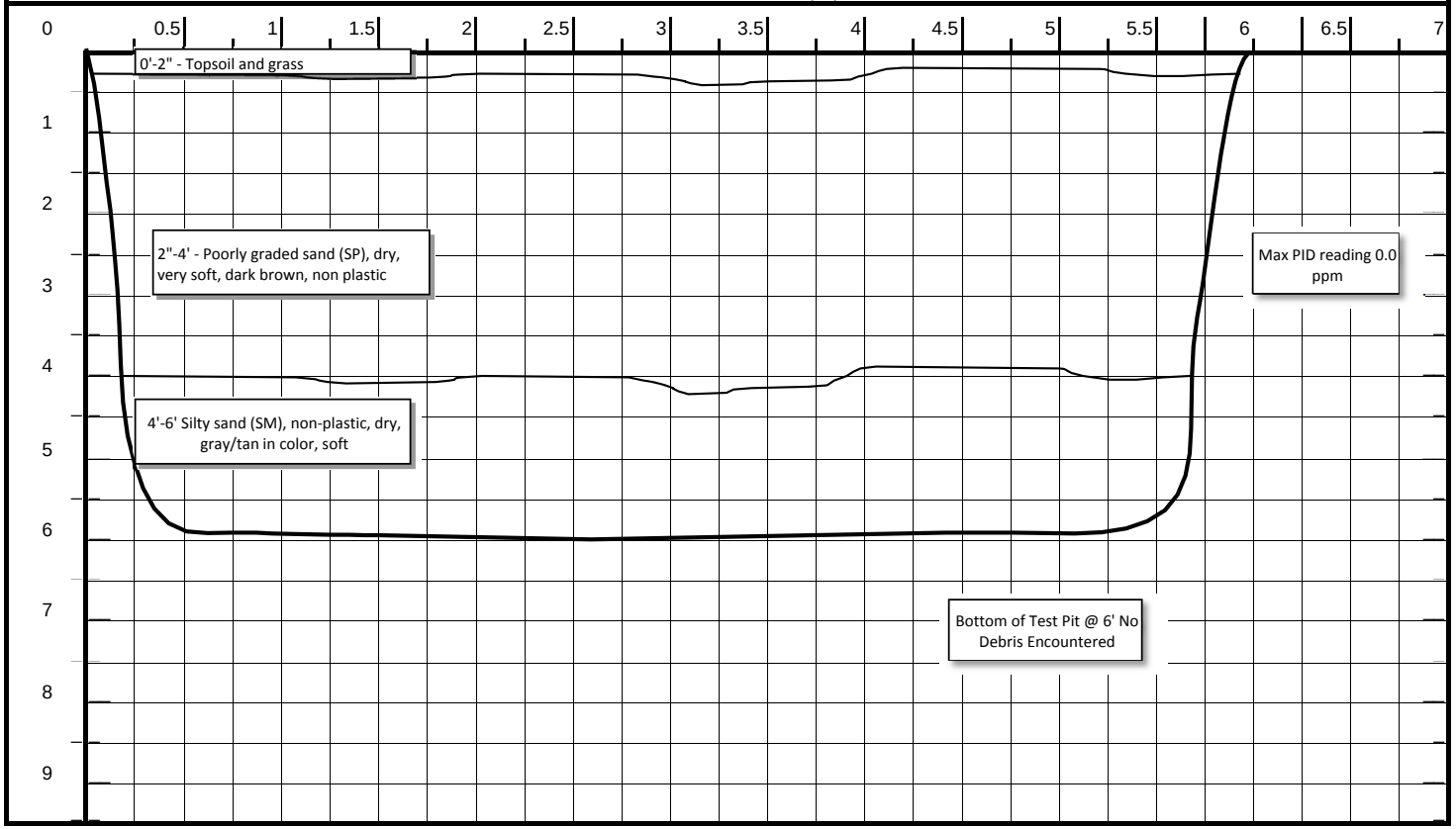
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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 364428.FI.FS	TEST PIT NUMBER TP113 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

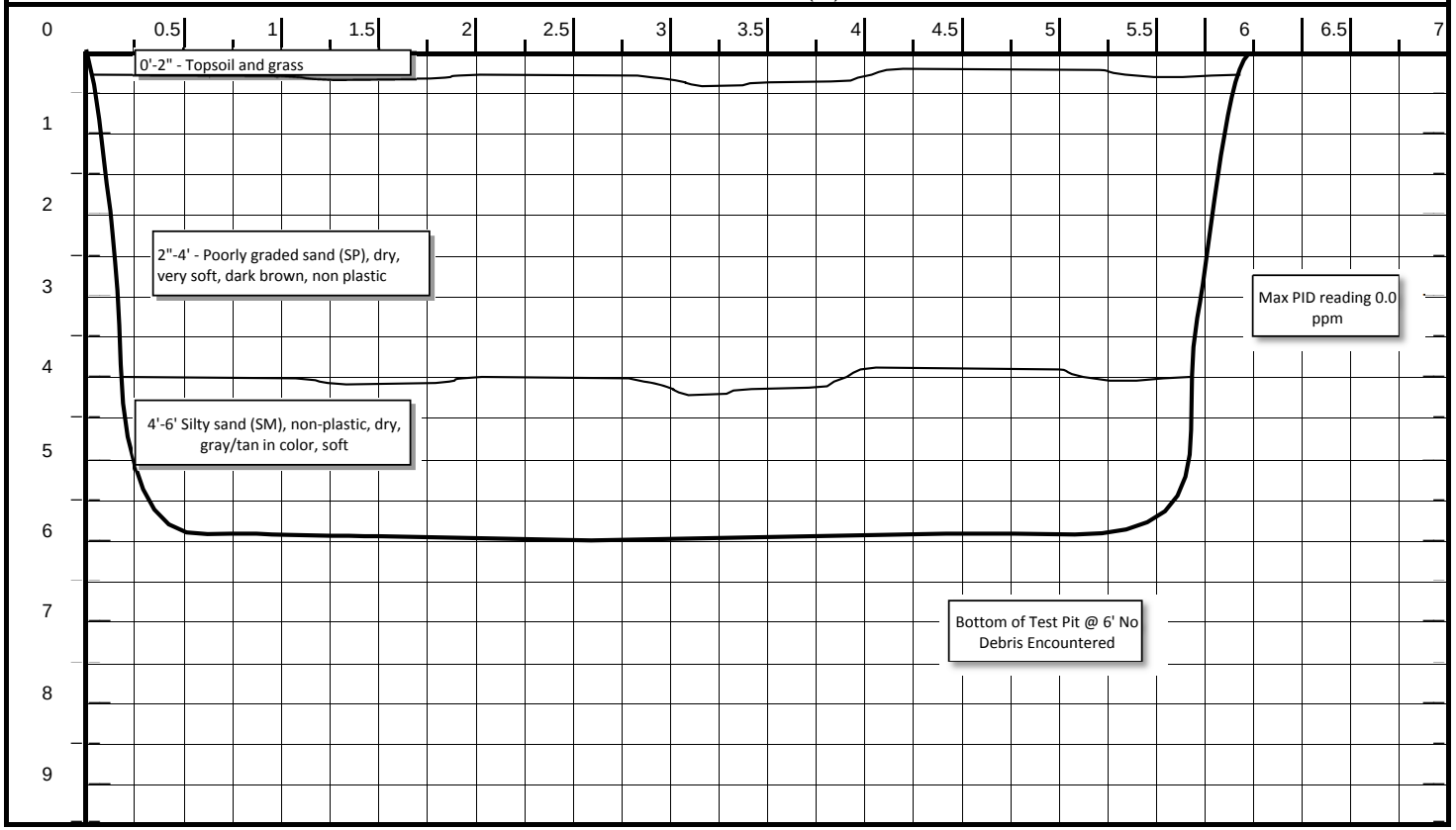
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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 364428.FI.FS	TEST PIT NUMBER TP114 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

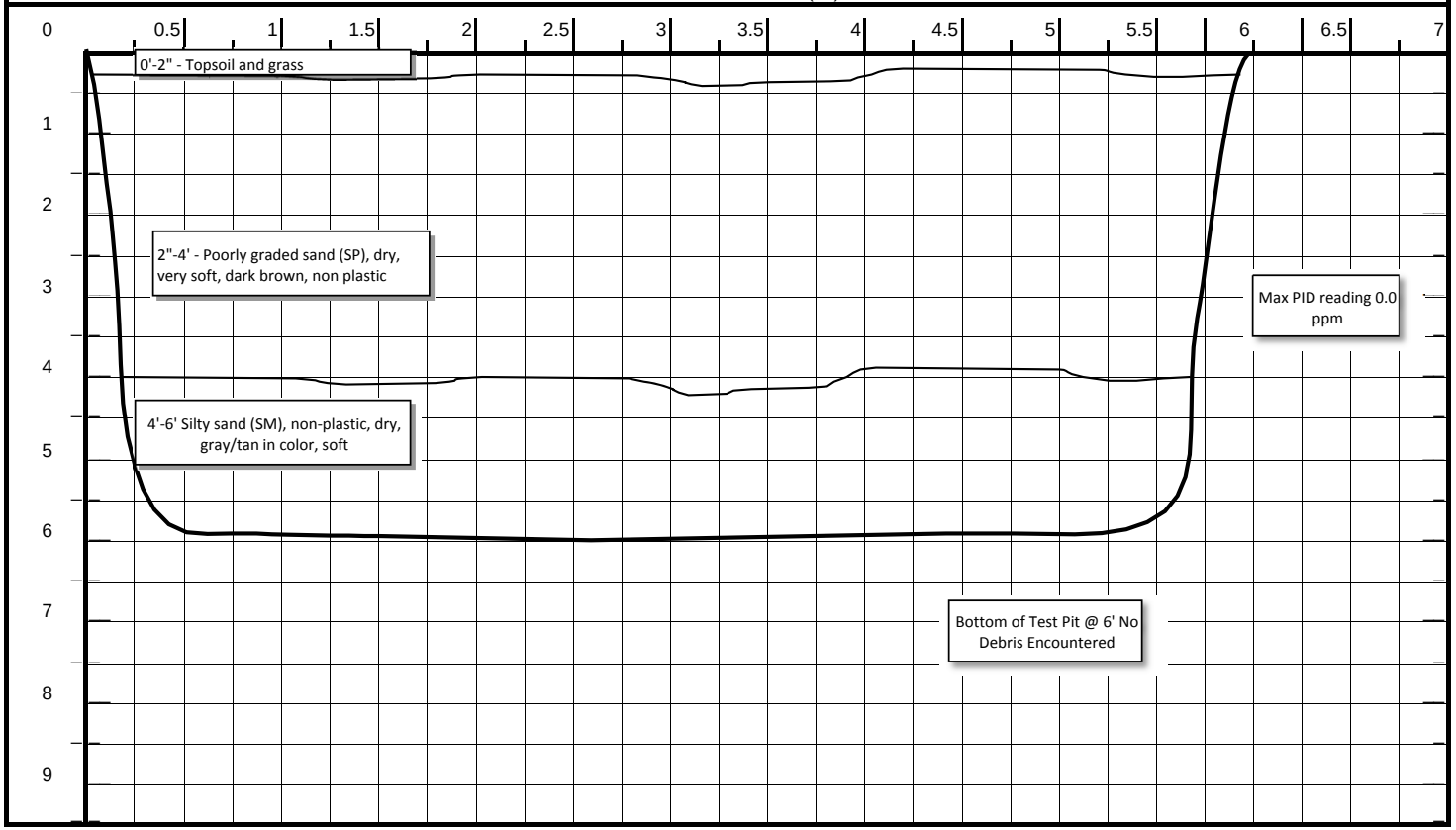
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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 364428.FI.FS	TEST PIT NUMBER TP115 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

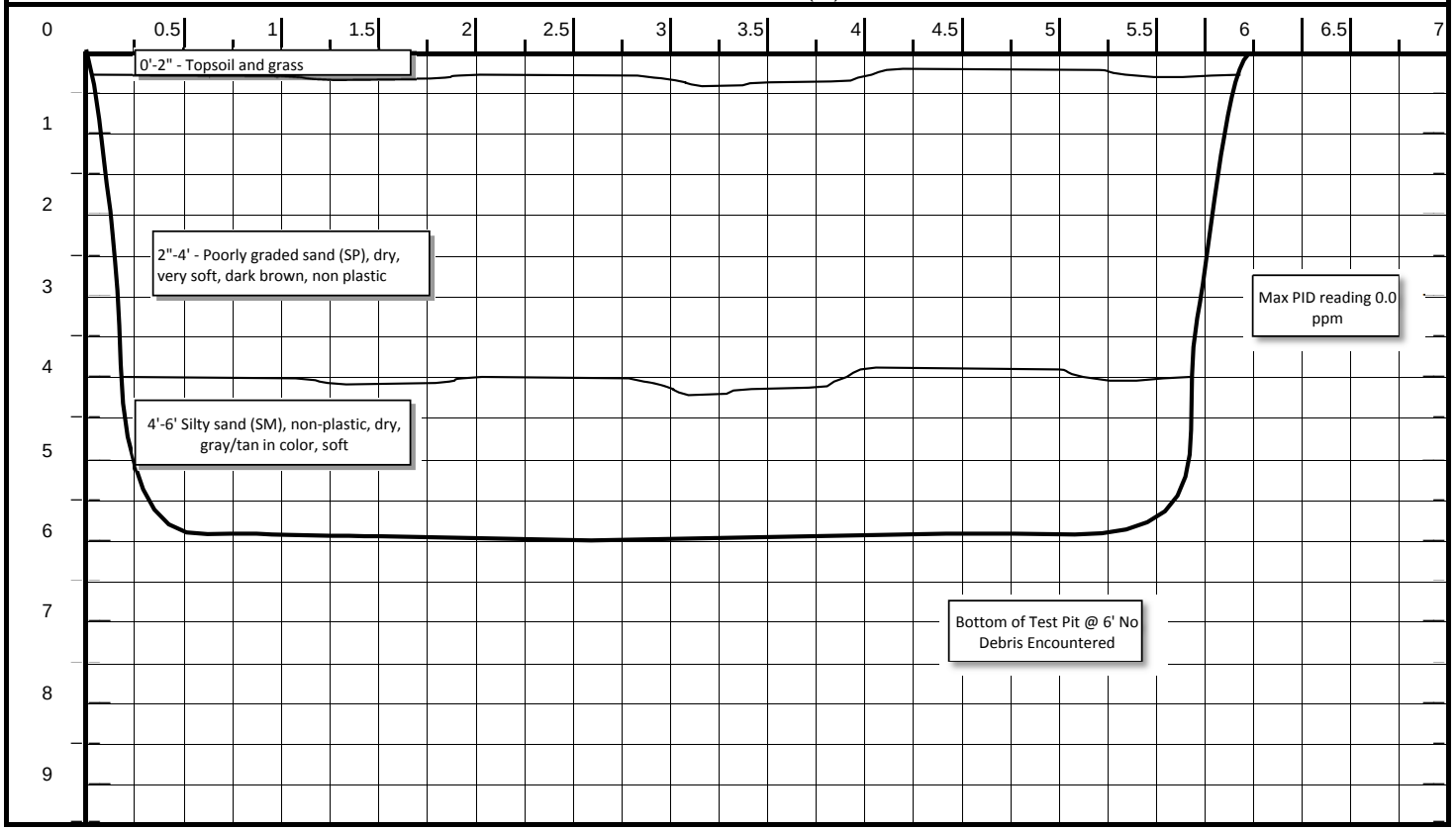
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP116** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

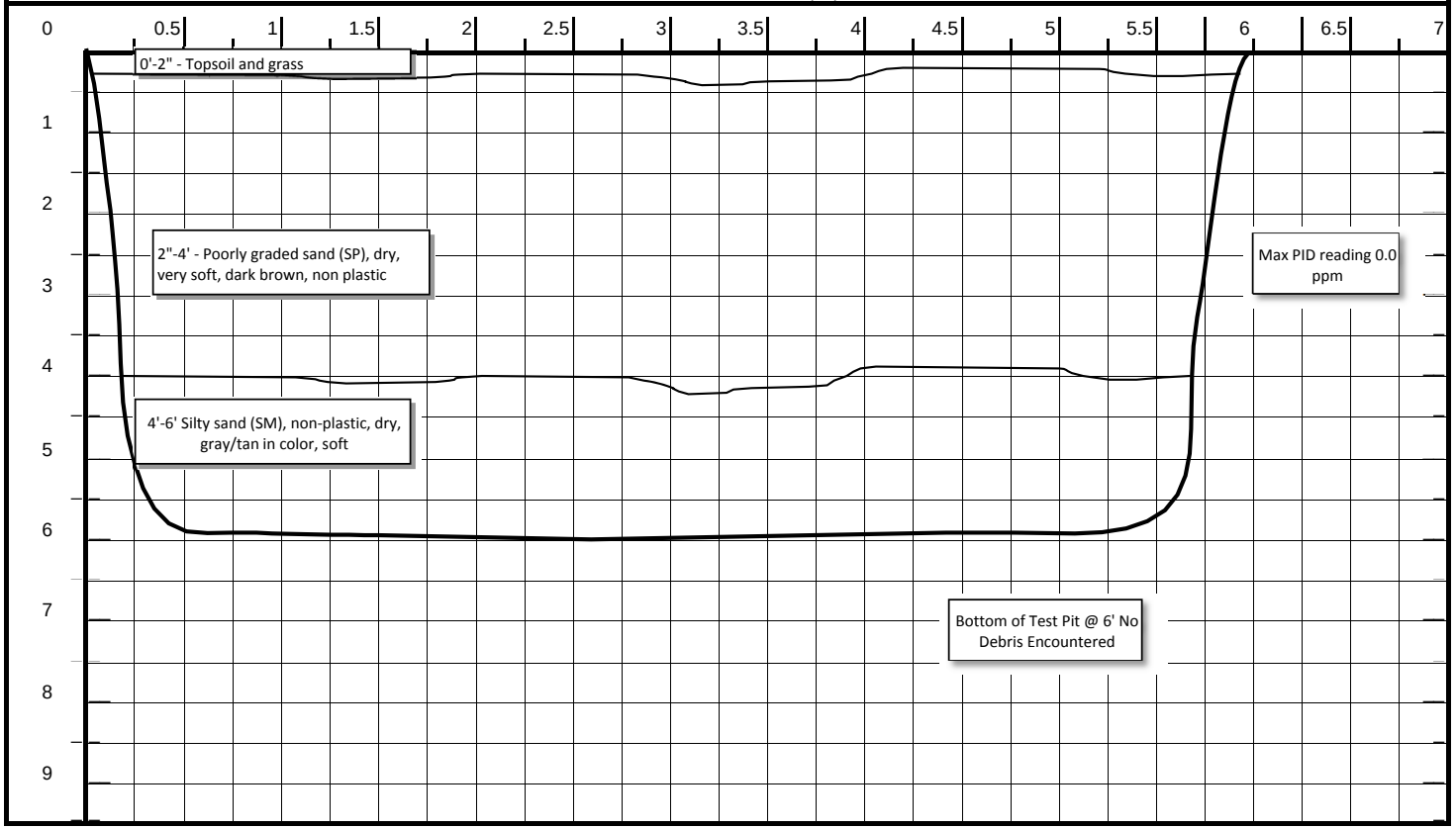
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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 364428.FI.FS	TEST PIT NUMBER TP117 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

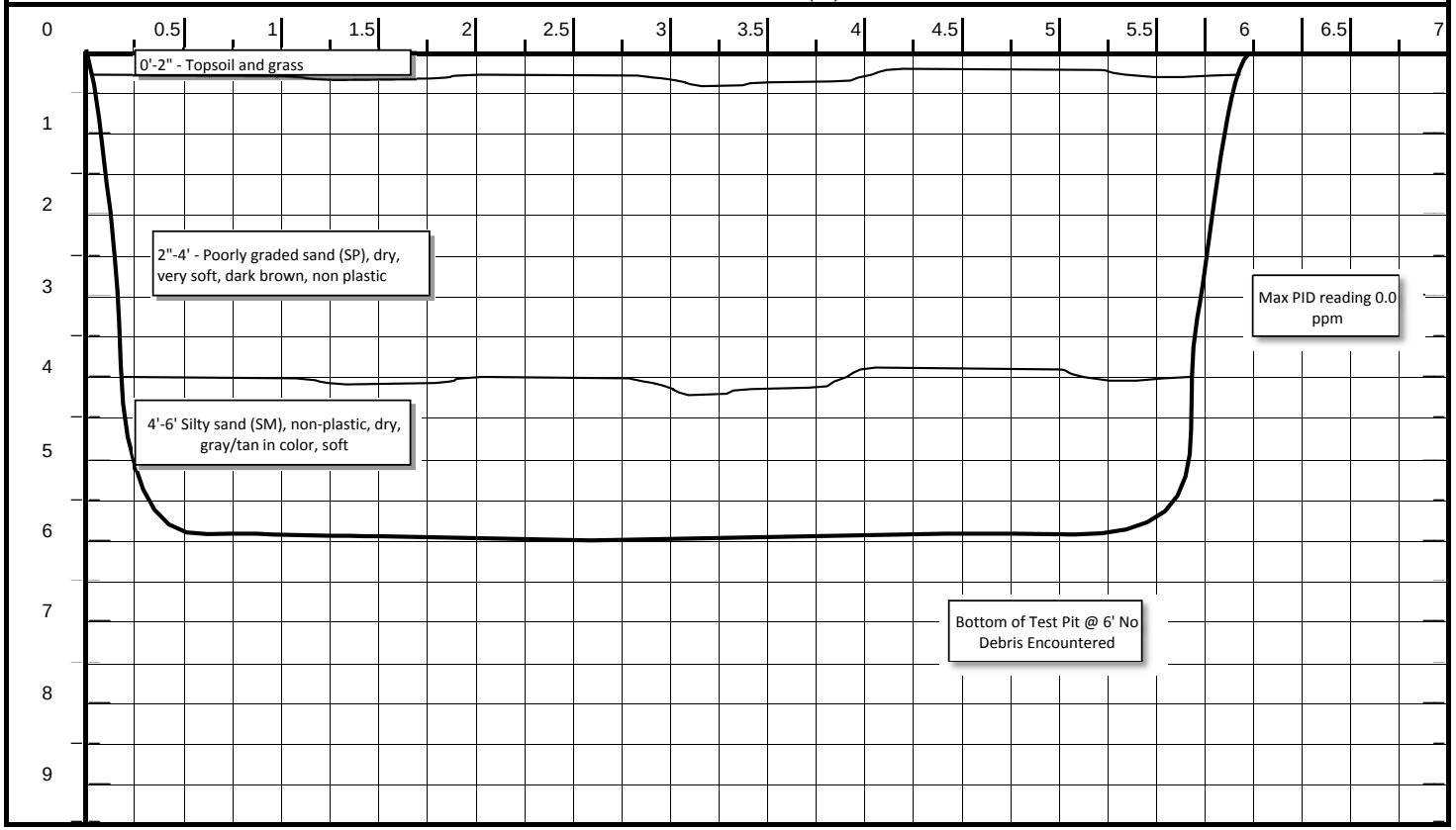
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP118** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

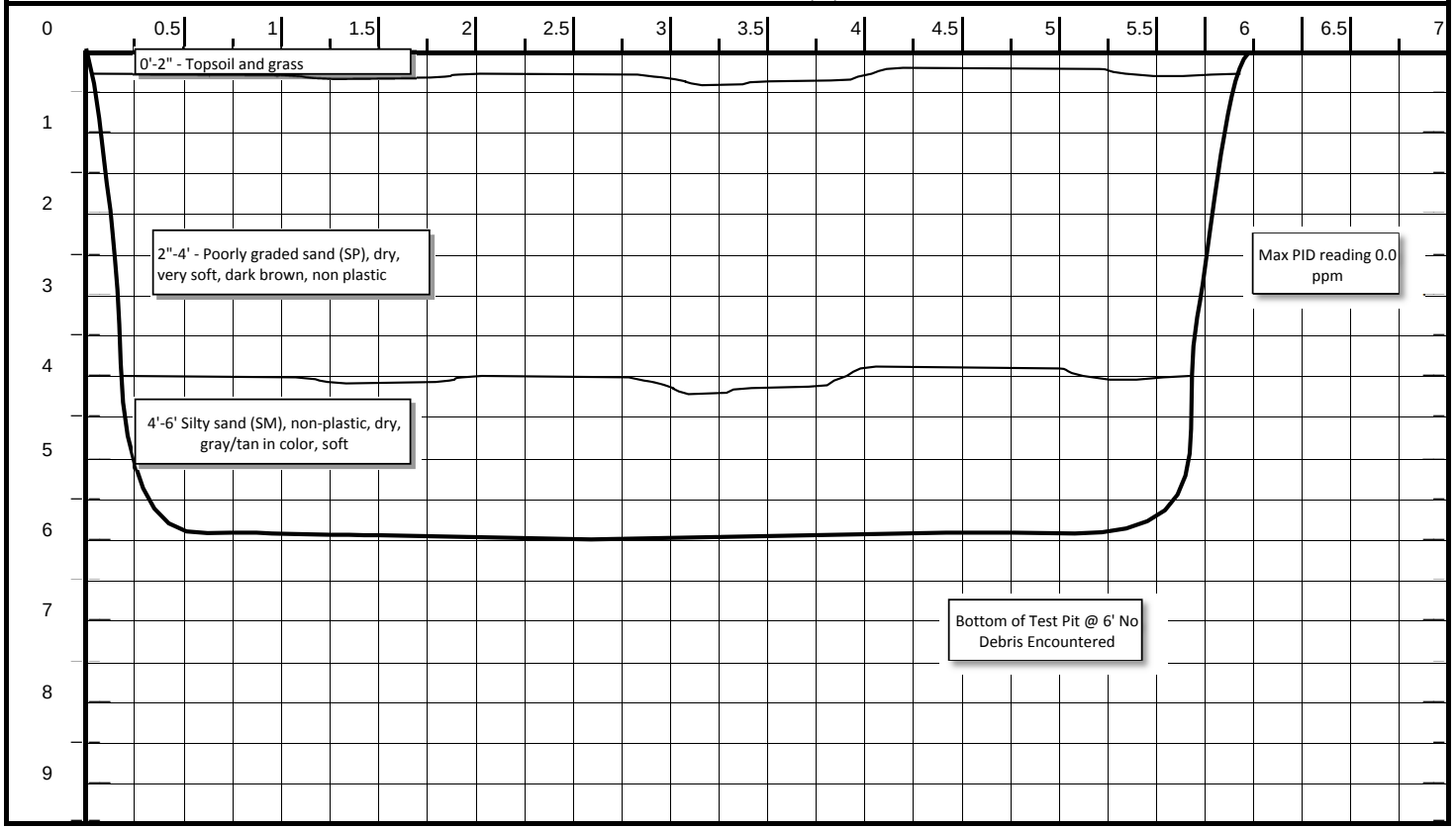
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP119** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

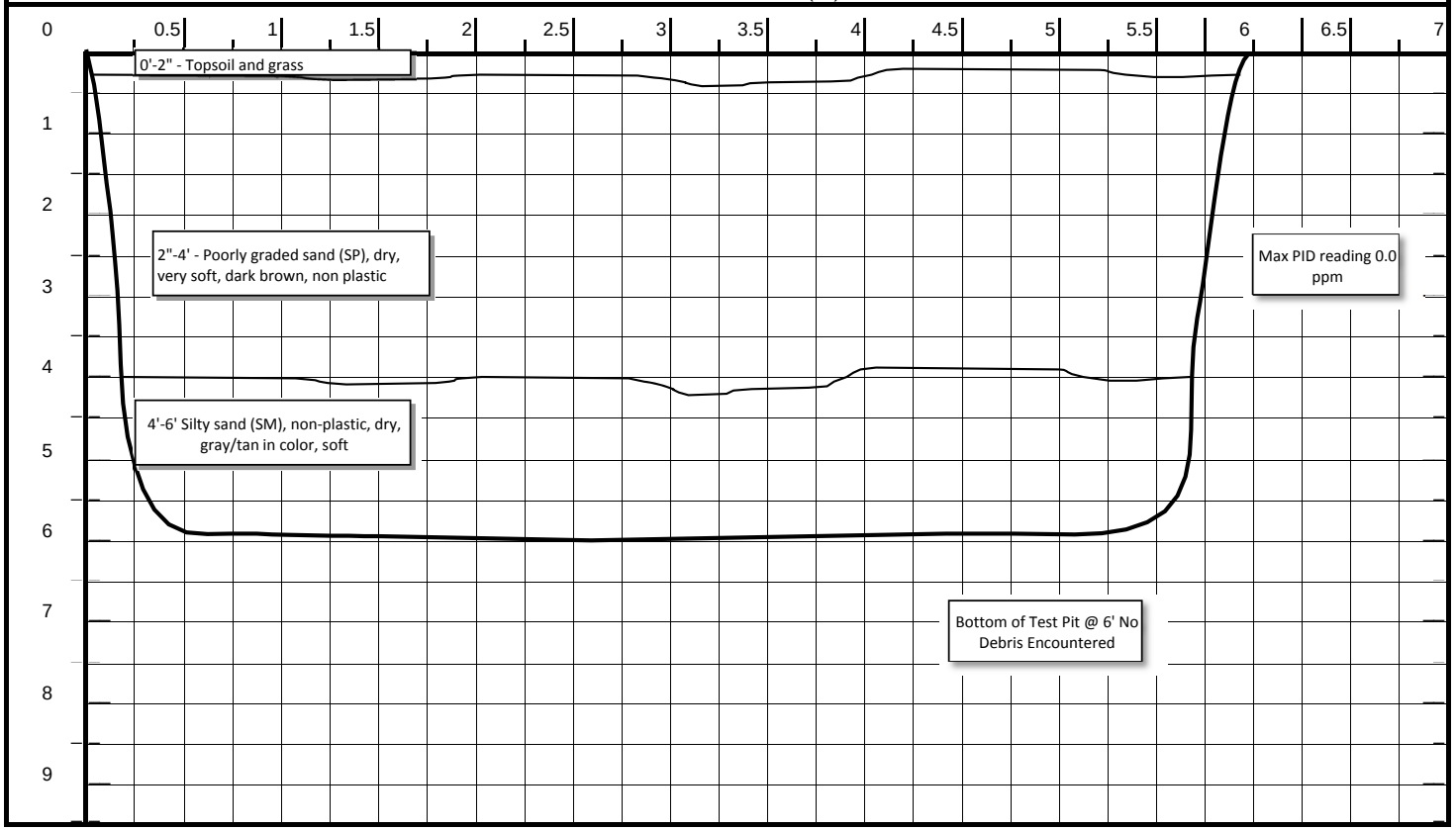
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP120** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

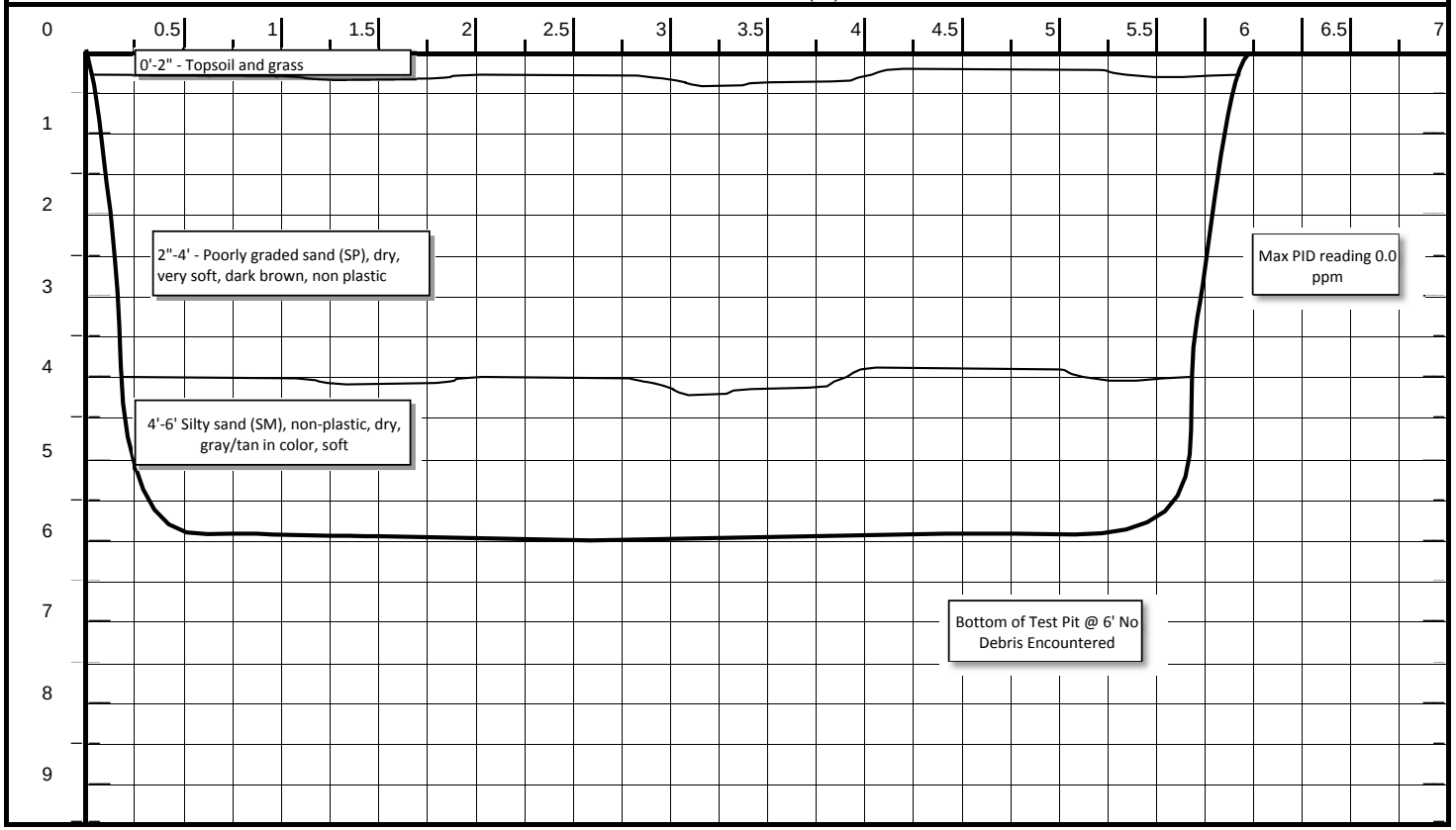
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

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

TEST PIT DIMENSIONS (FT)



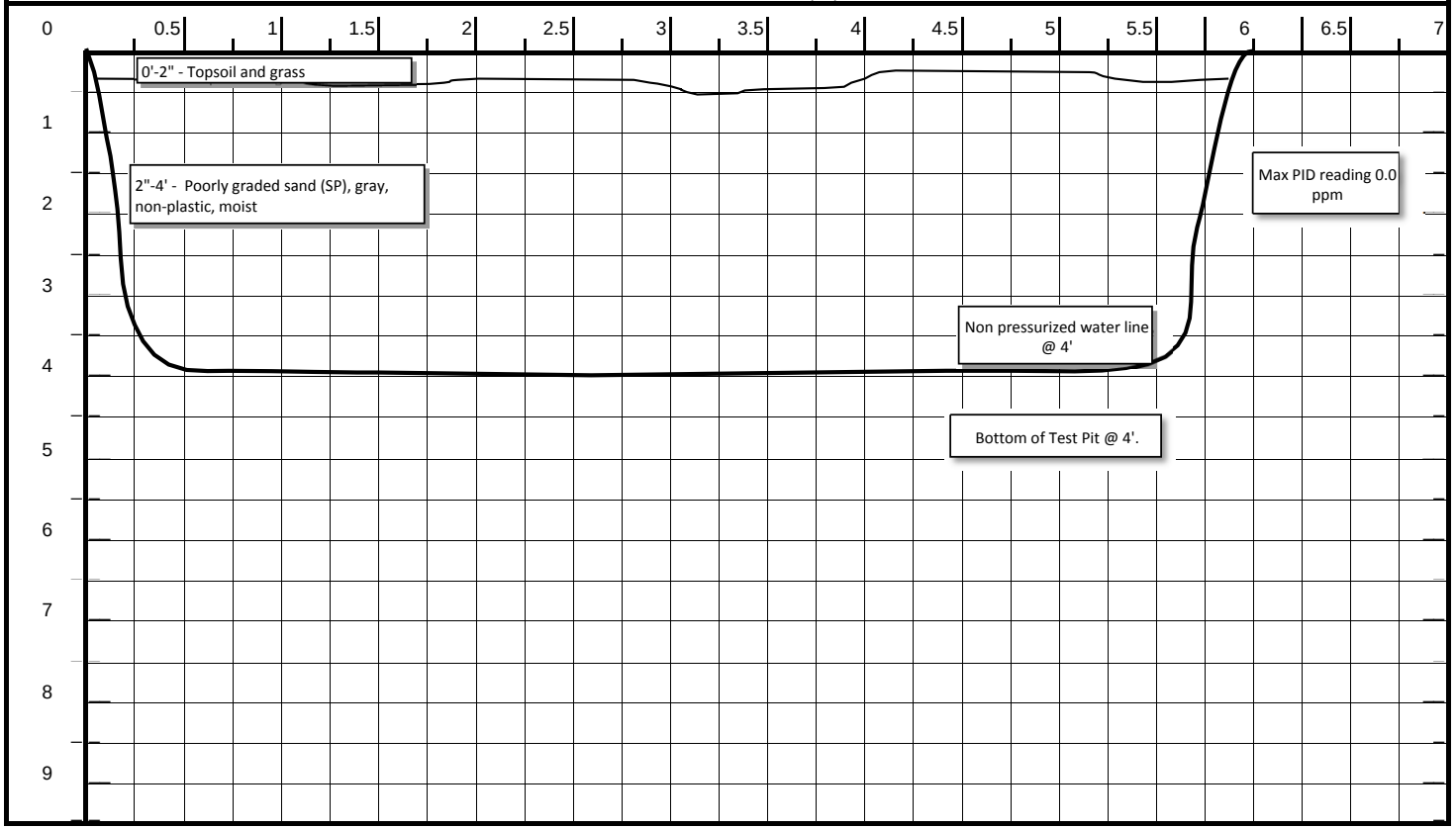
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TP121** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Backhoe Excavator 442		DATE EXCAVATED: 4/20/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 4 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP122** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

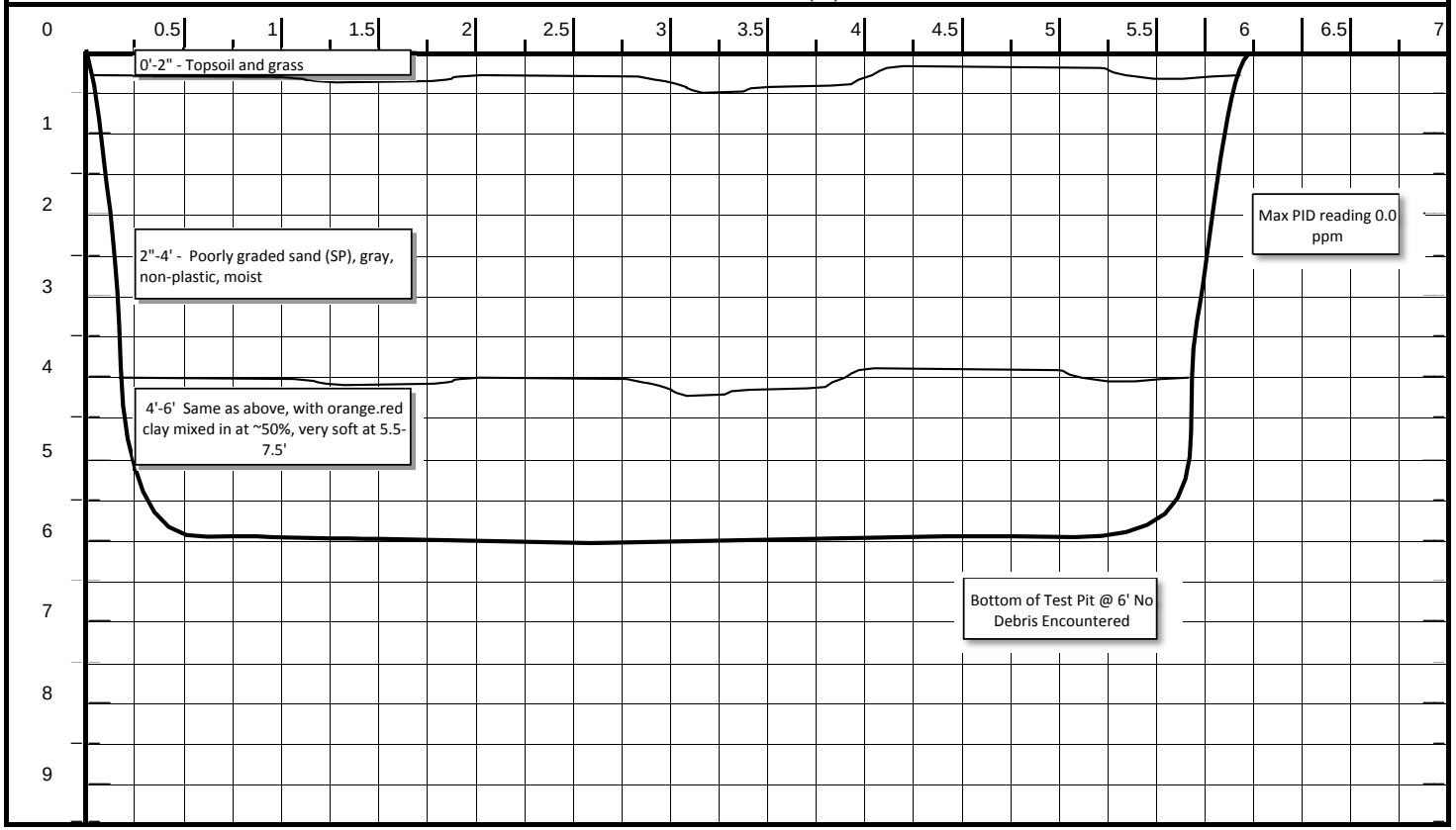
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP123** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

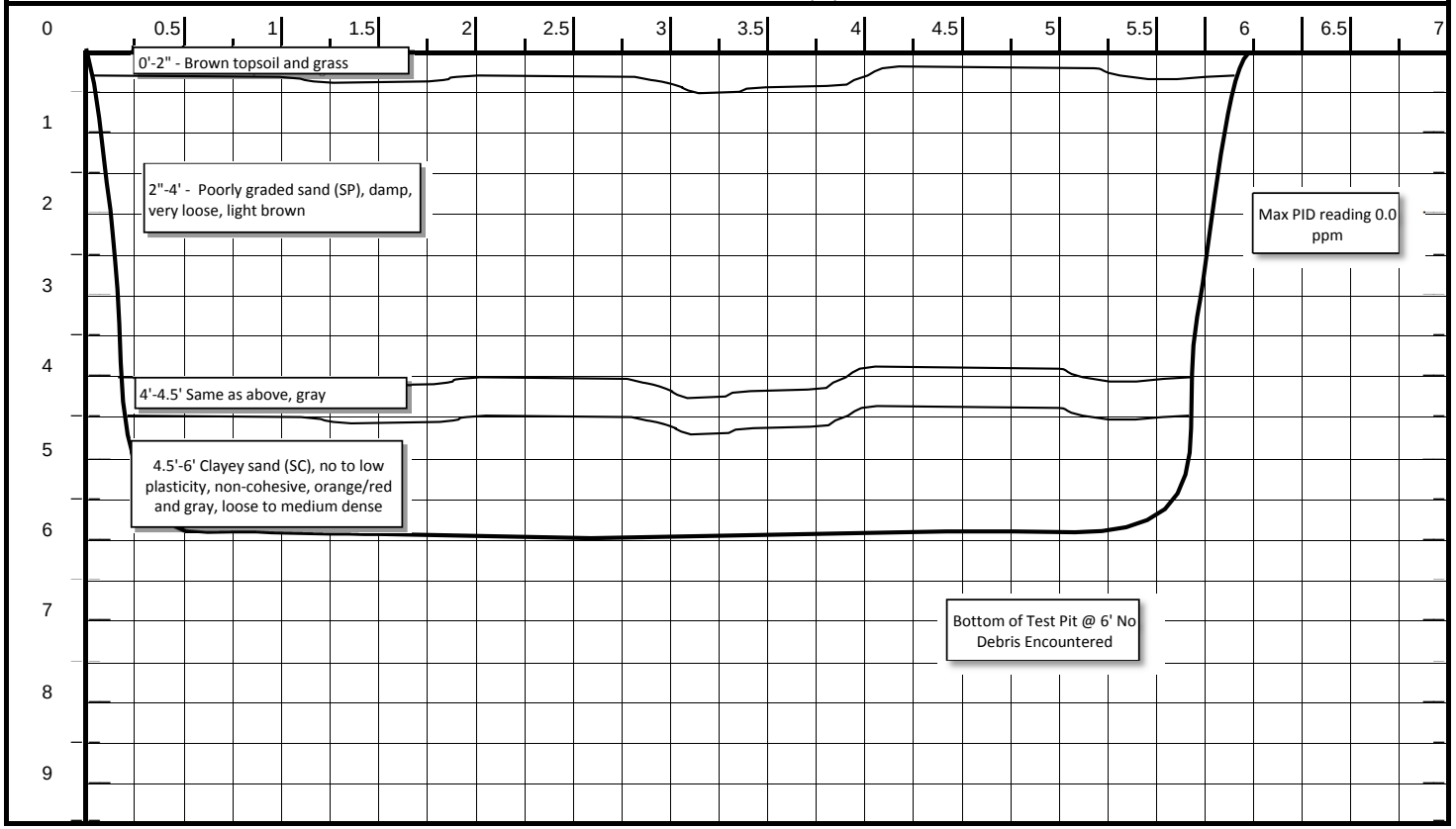
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP124** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

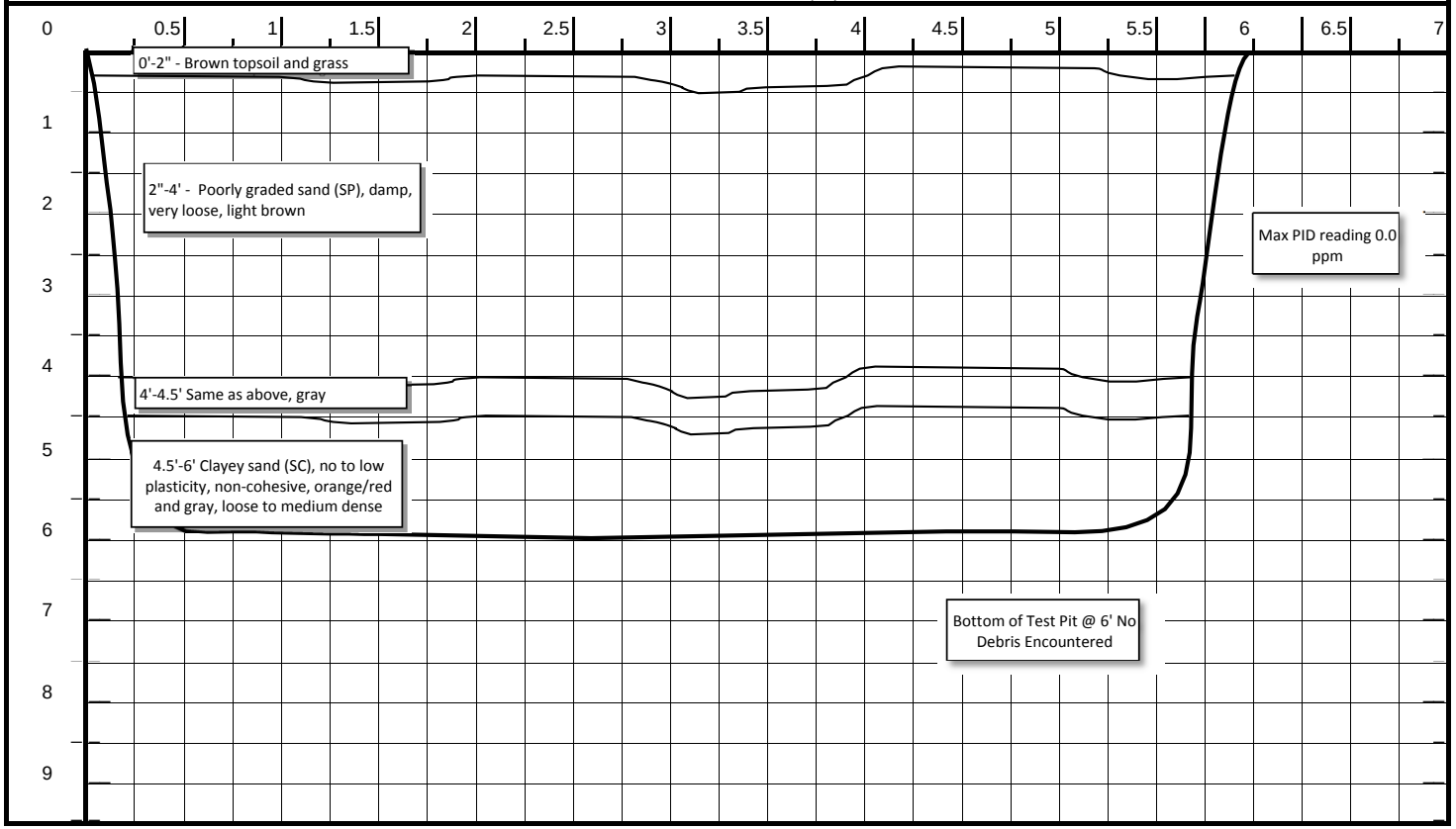
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP125** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

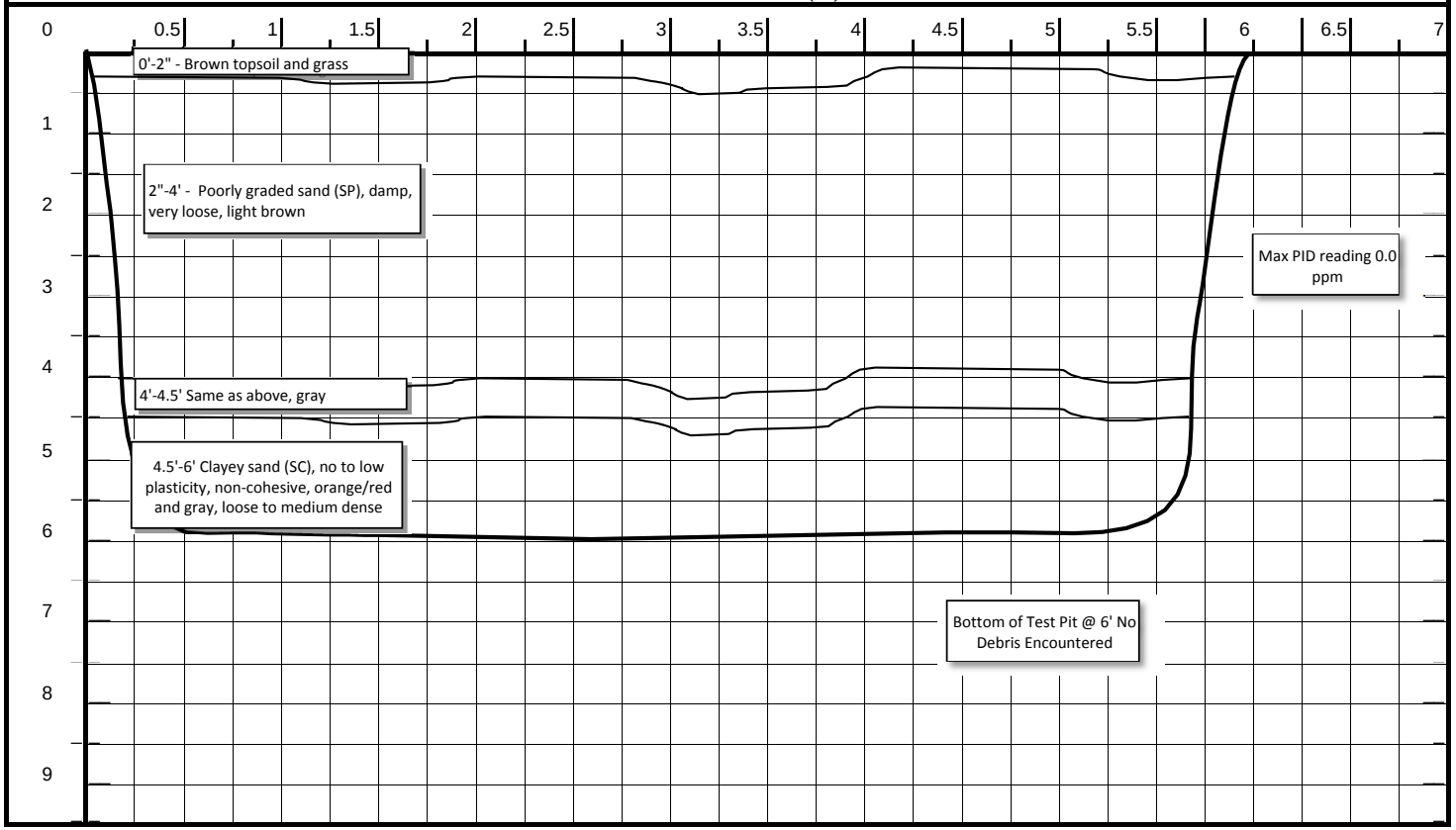
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP126** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

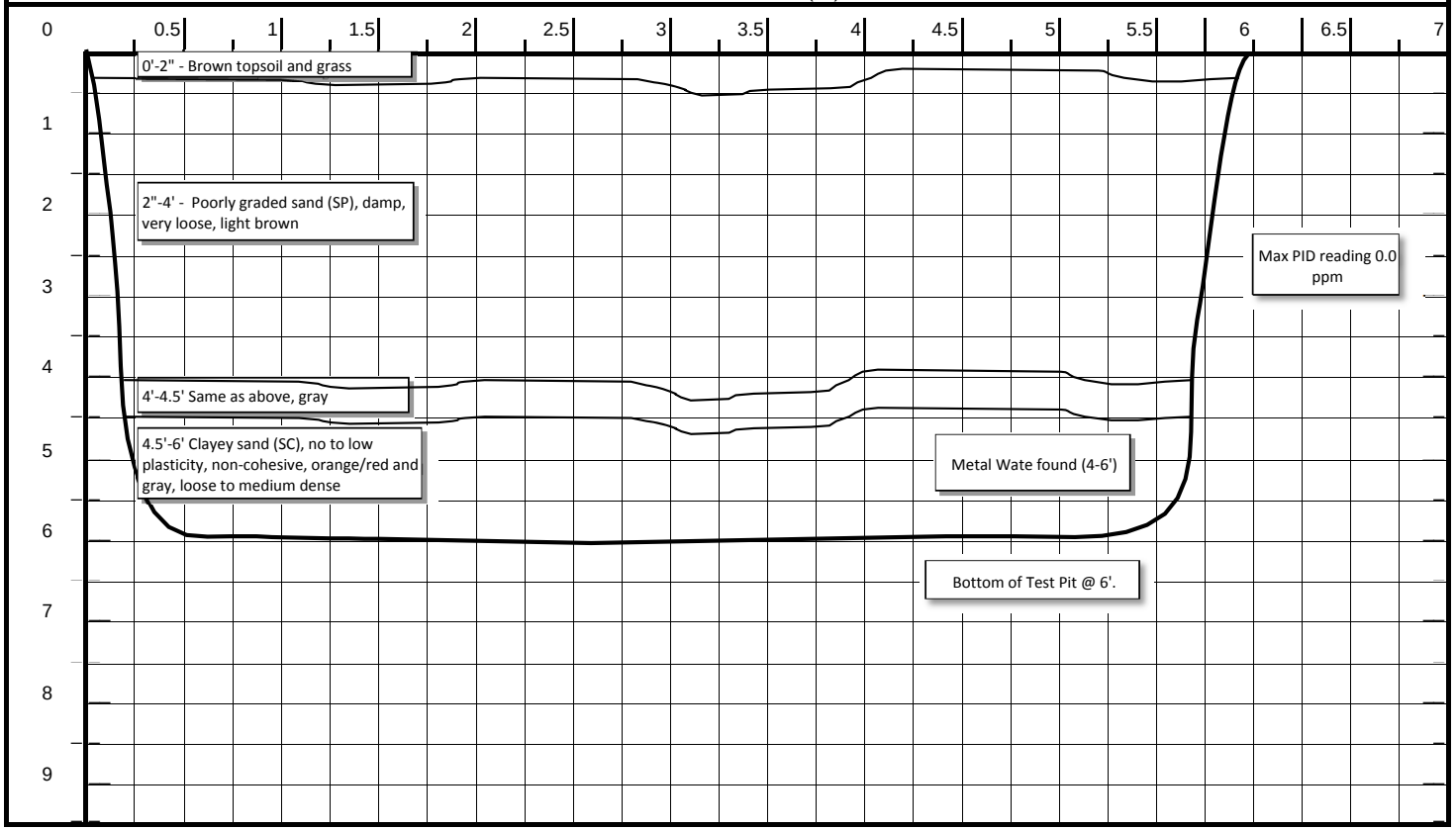
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP127** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

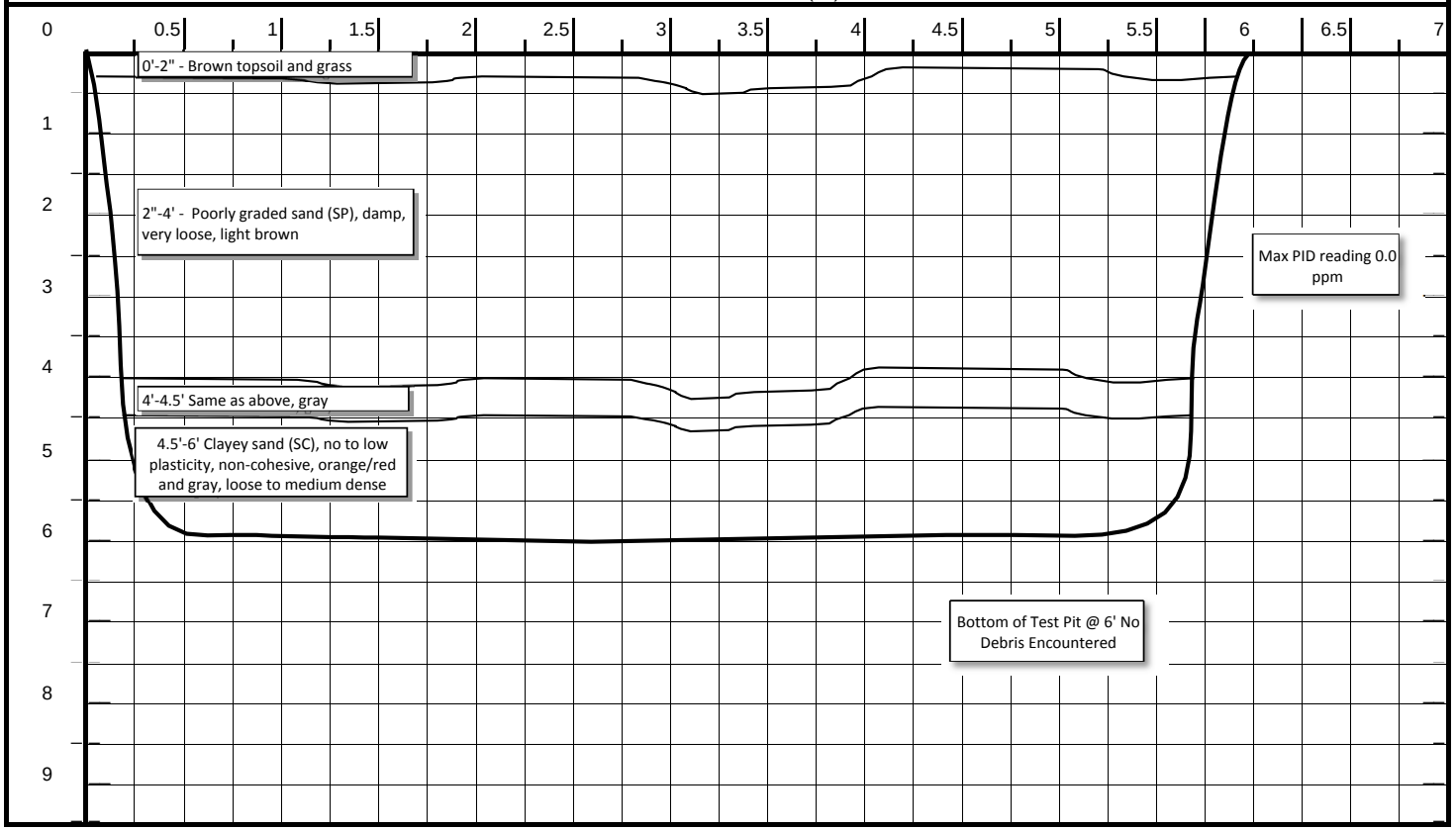
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP128** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

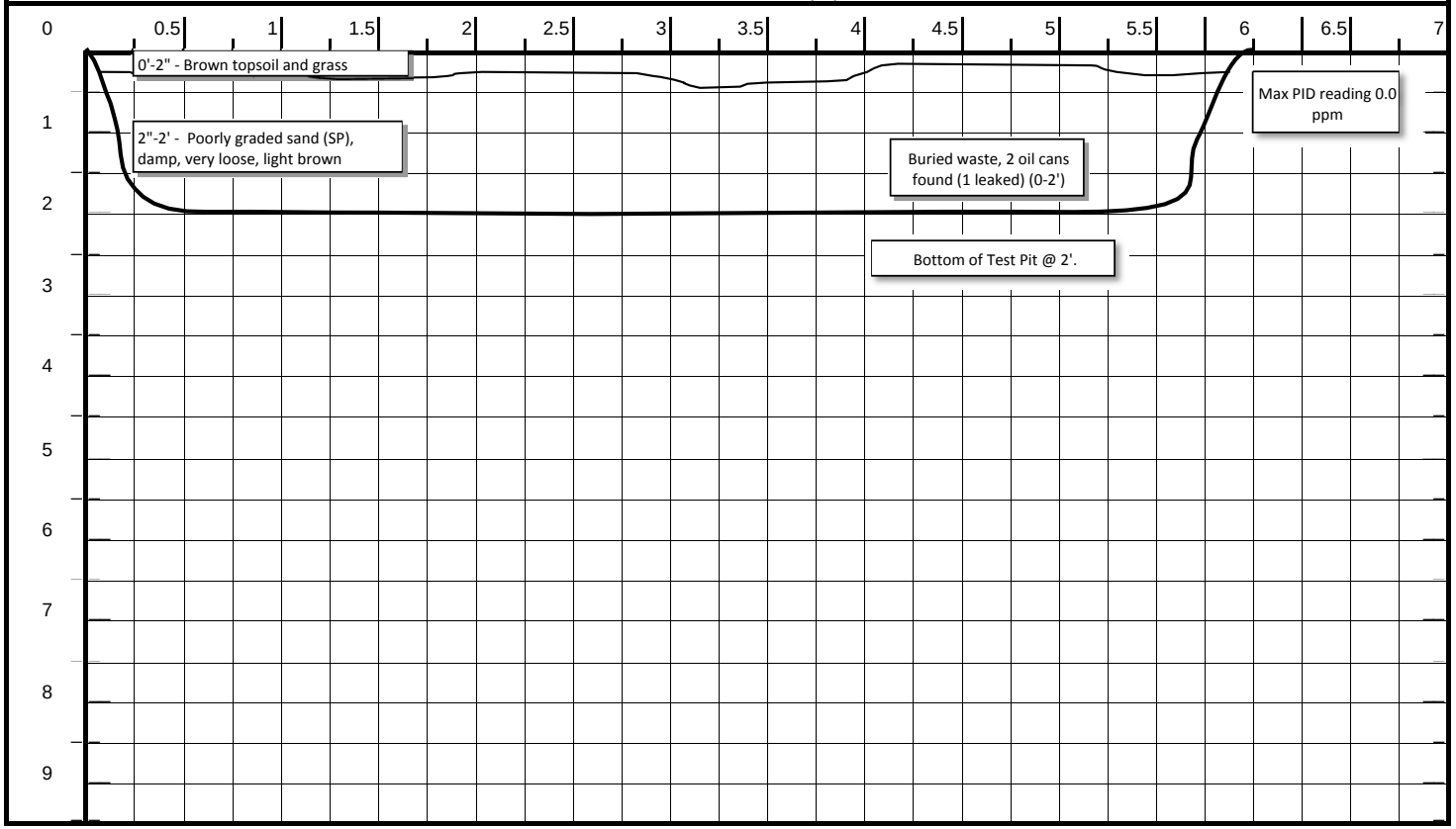
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 2 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP129** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

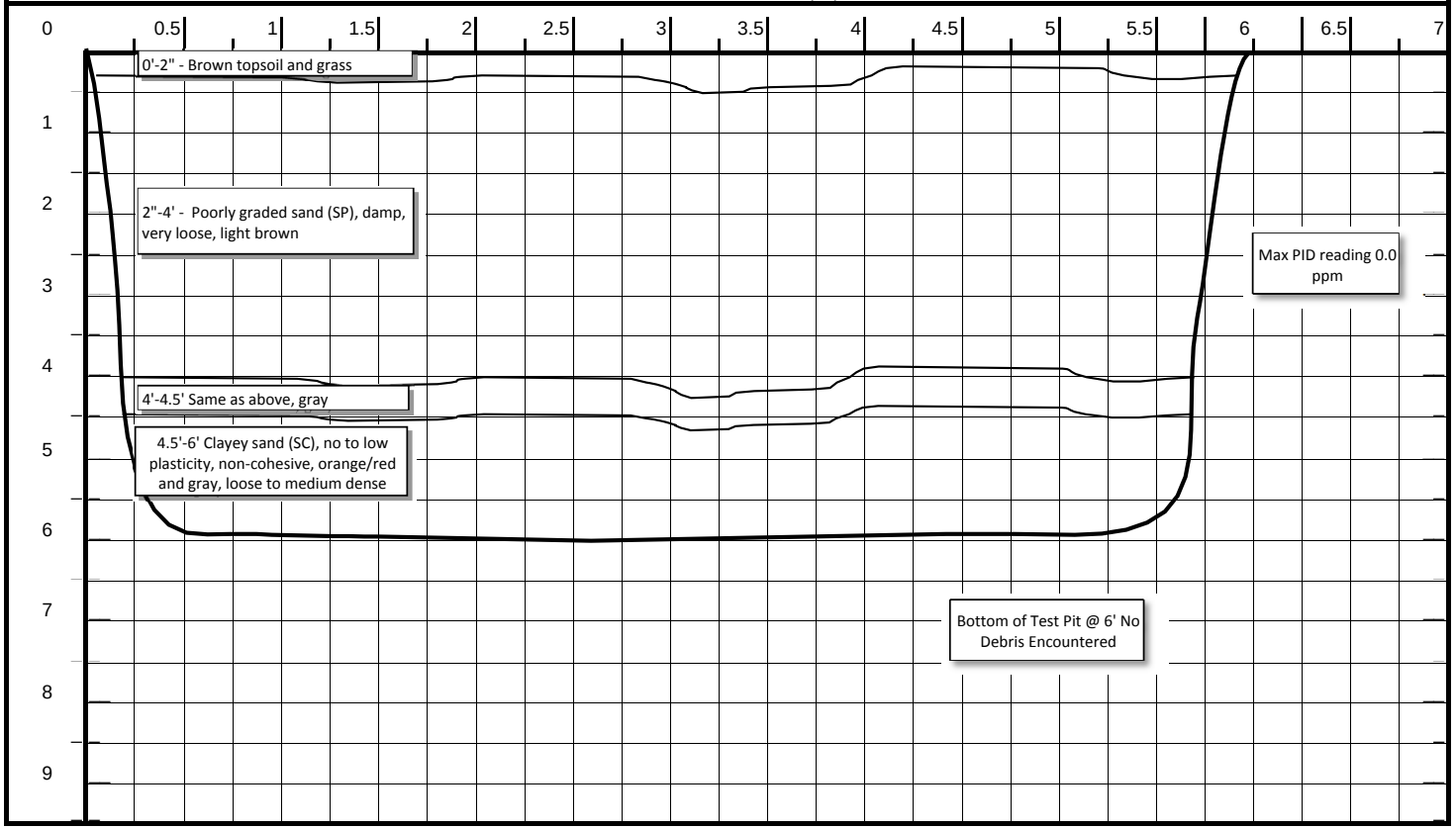
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP130** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

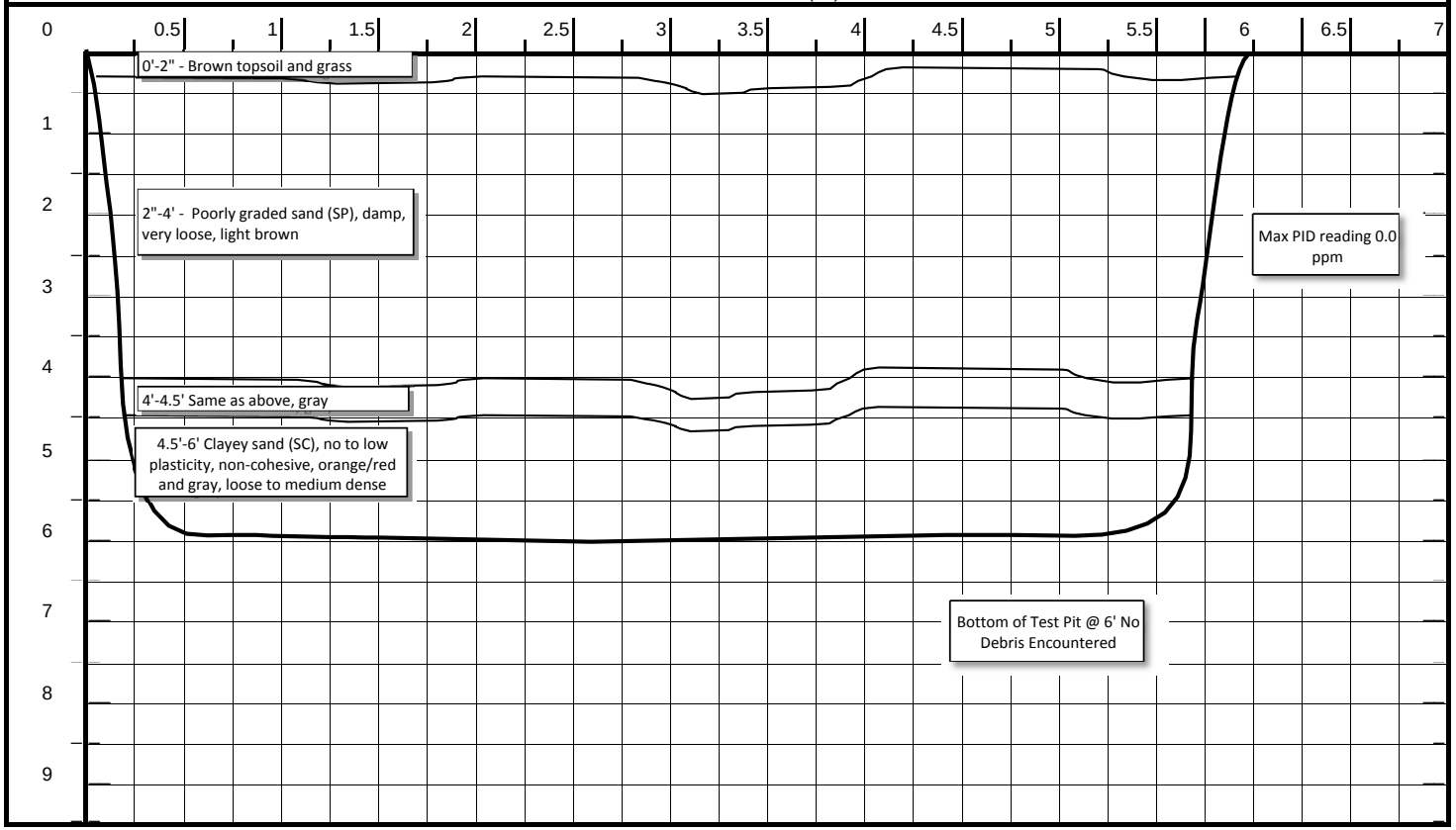
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP131** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

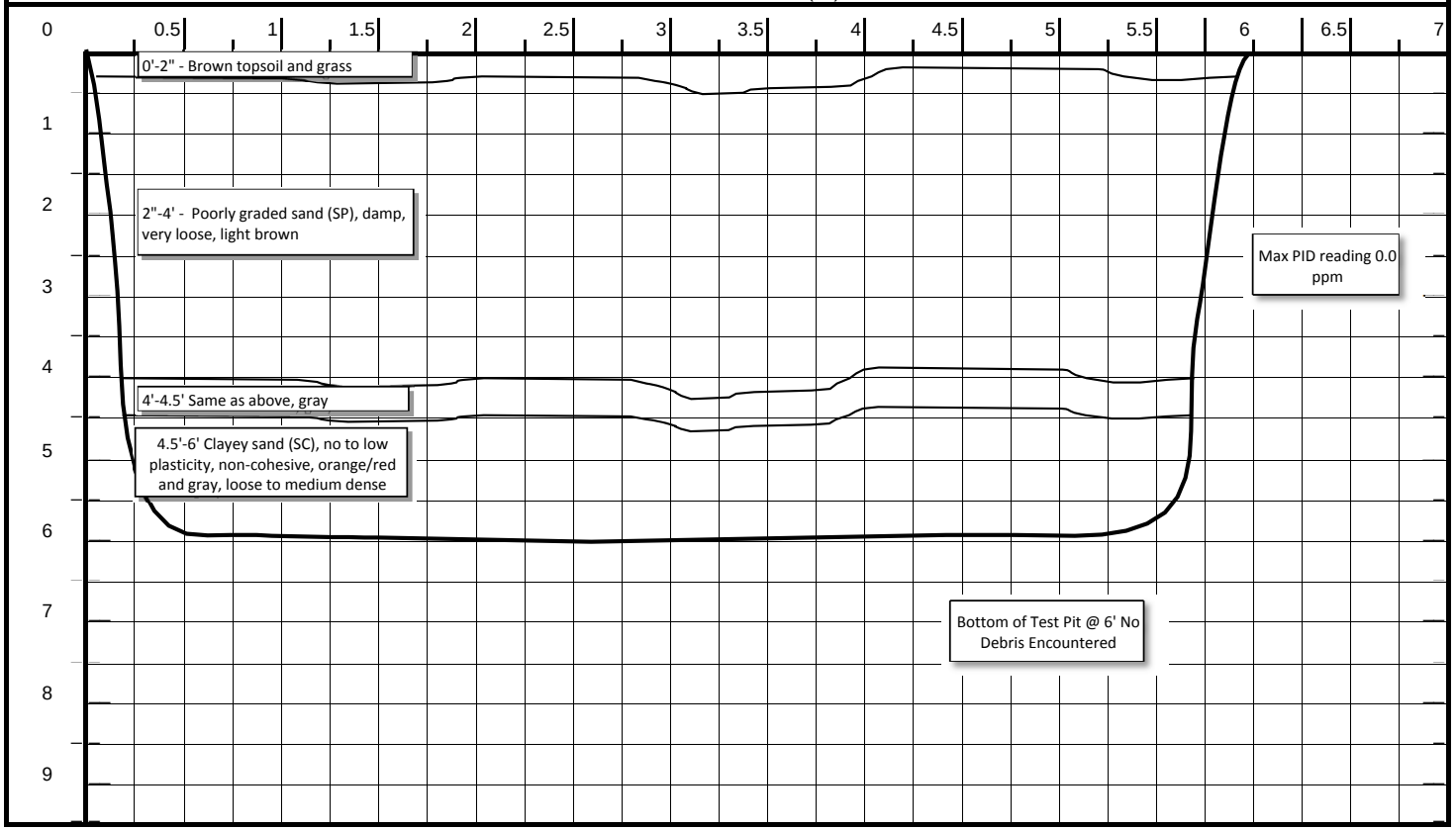
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP132** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

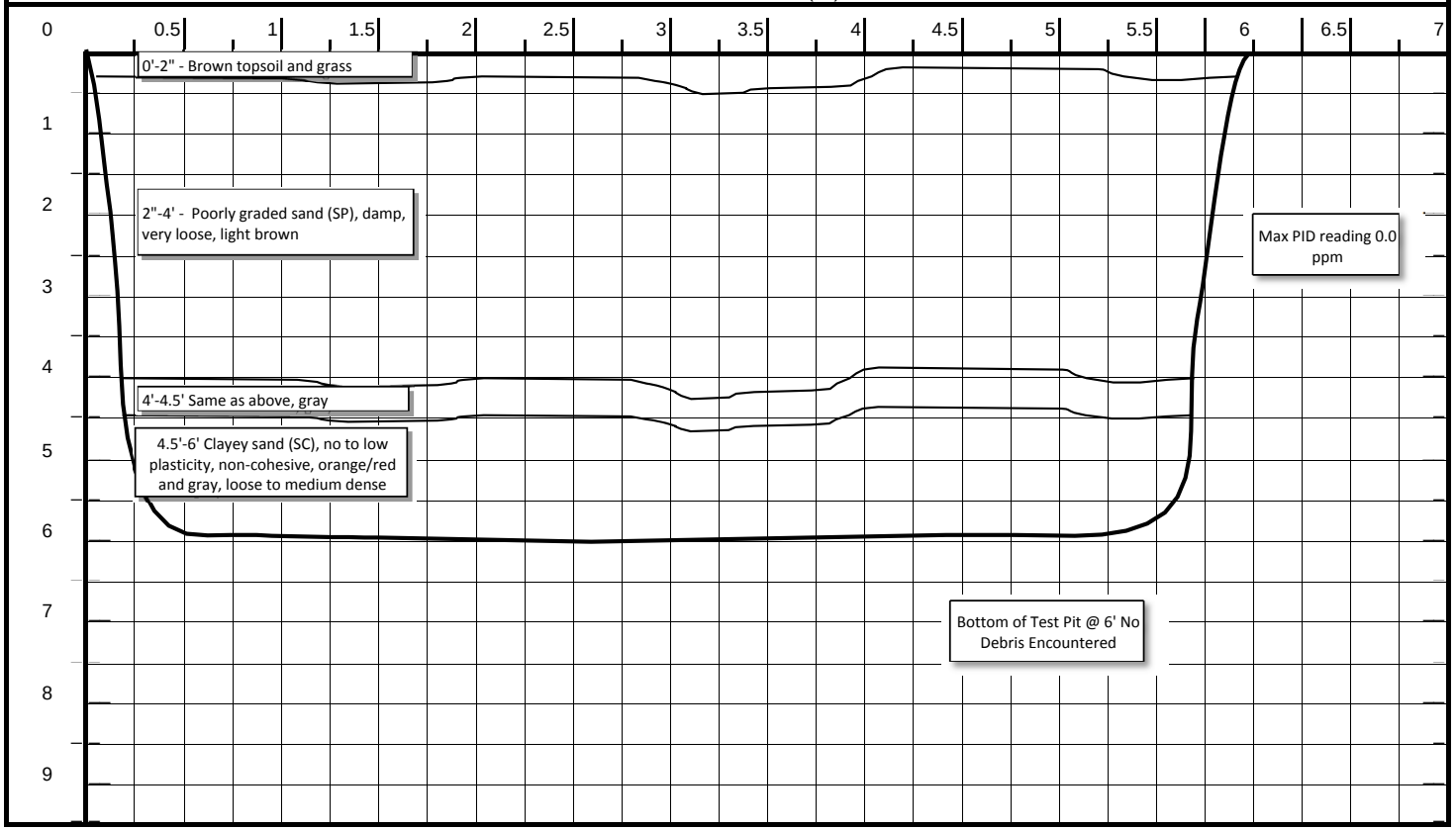
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP133** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

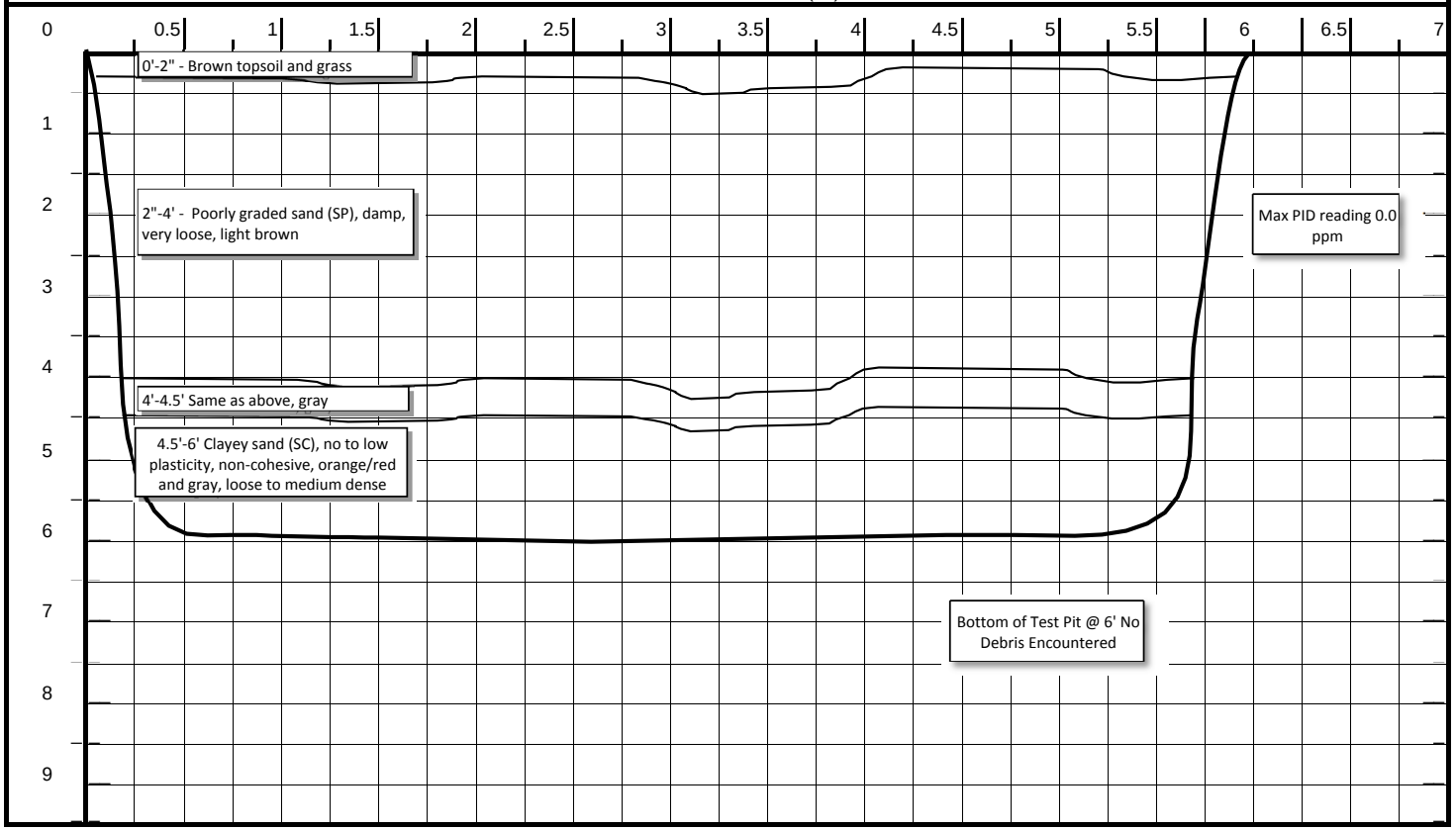
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

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

TEST PIT DIMENSIONS (FT)



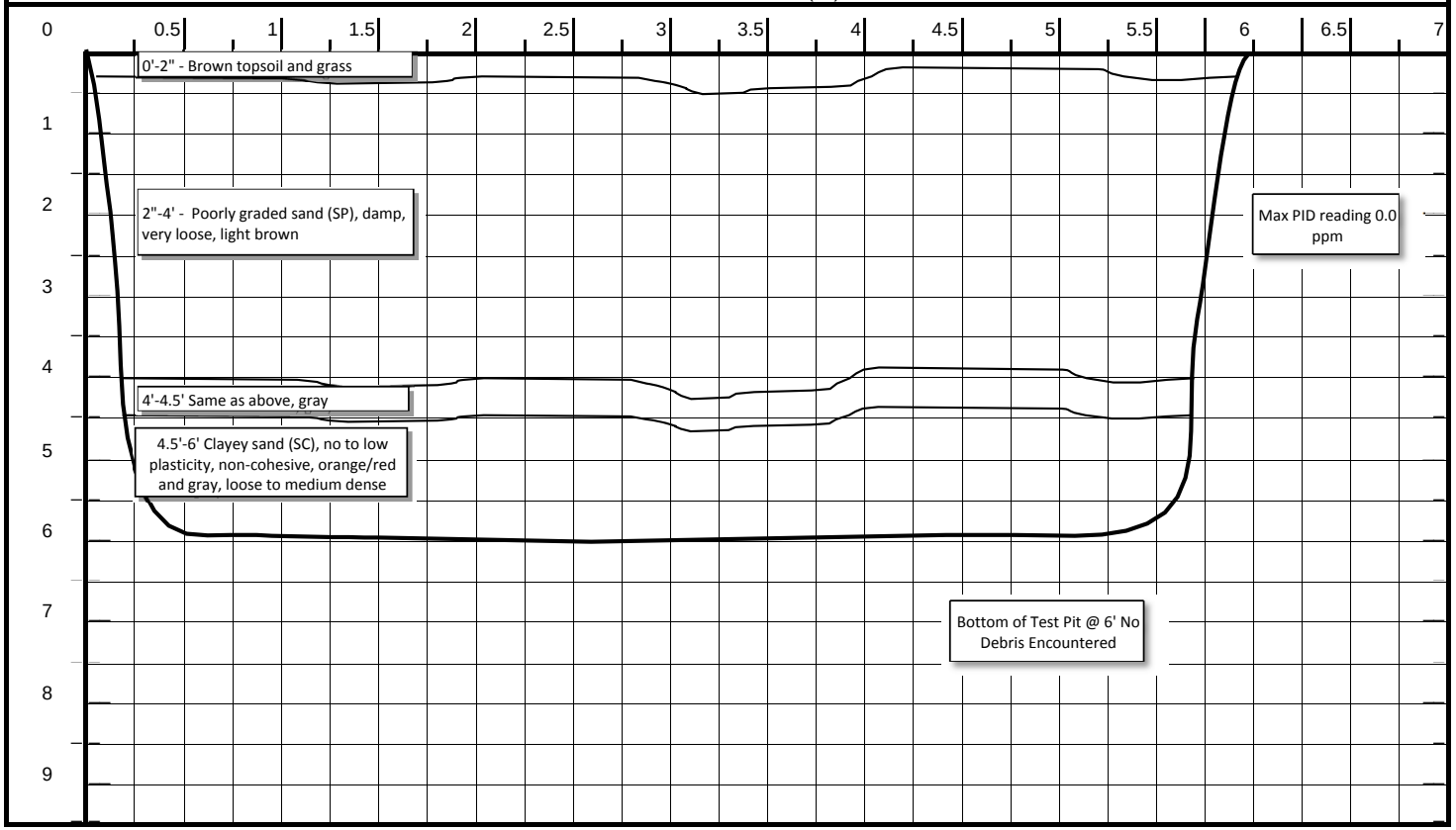
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TP134** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Bobcat Excavator 442		DATE EXCAVATED: 4/22/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 6 ft

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

TEST PIT DIMENSIONS (FT)



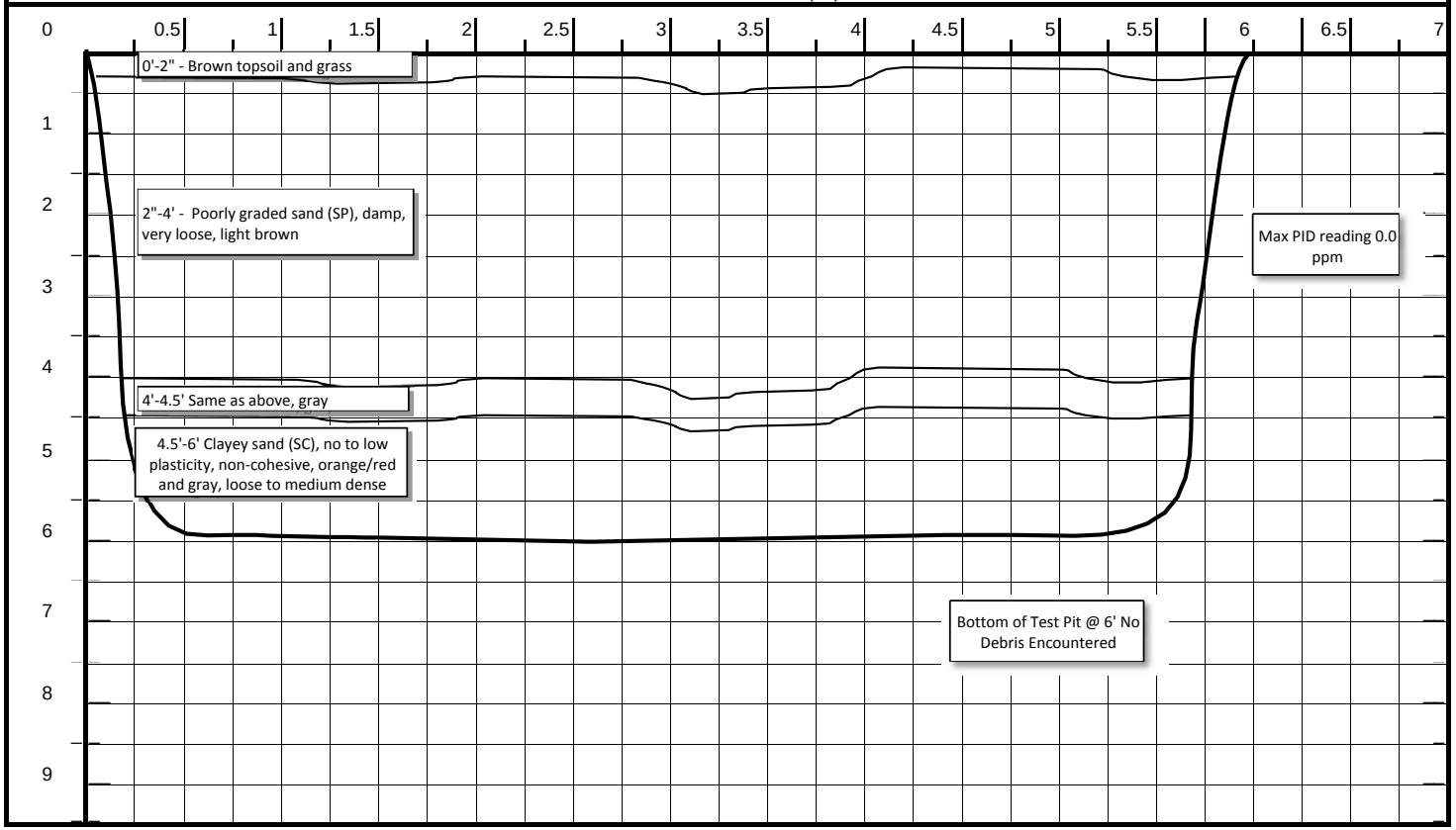
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TP135** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Bobcat Excavator 442		DATE EXCAVATED: 4/22/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP136** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 LOCATION :Naval Weapons Station Yorktown LOGGER : Kimberley Coke

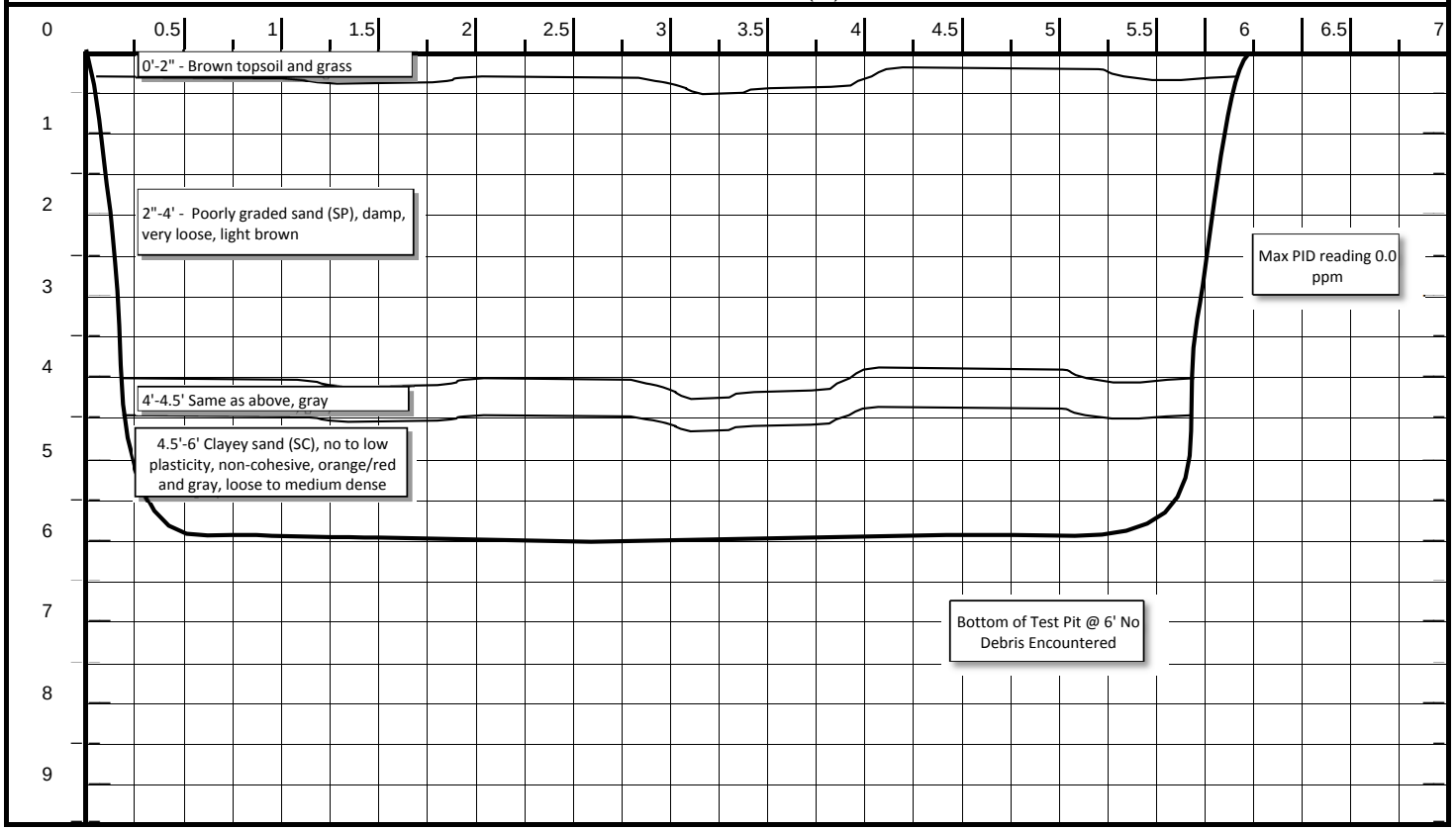
ELEVATION : Not Measured CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A APPROX. DIMENS: Length: 6 ft Width: 3 ft Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP137** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

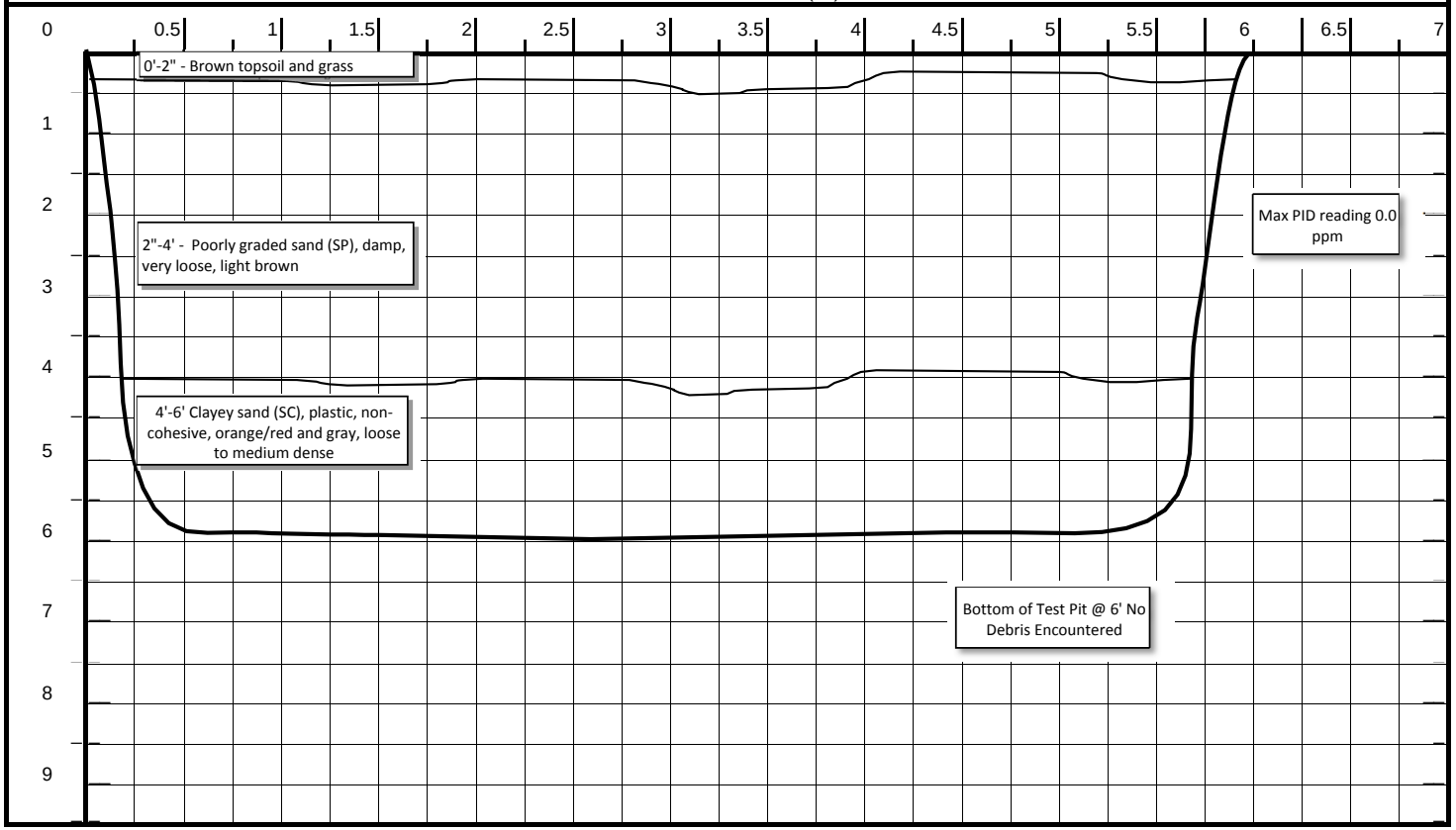
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP138** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

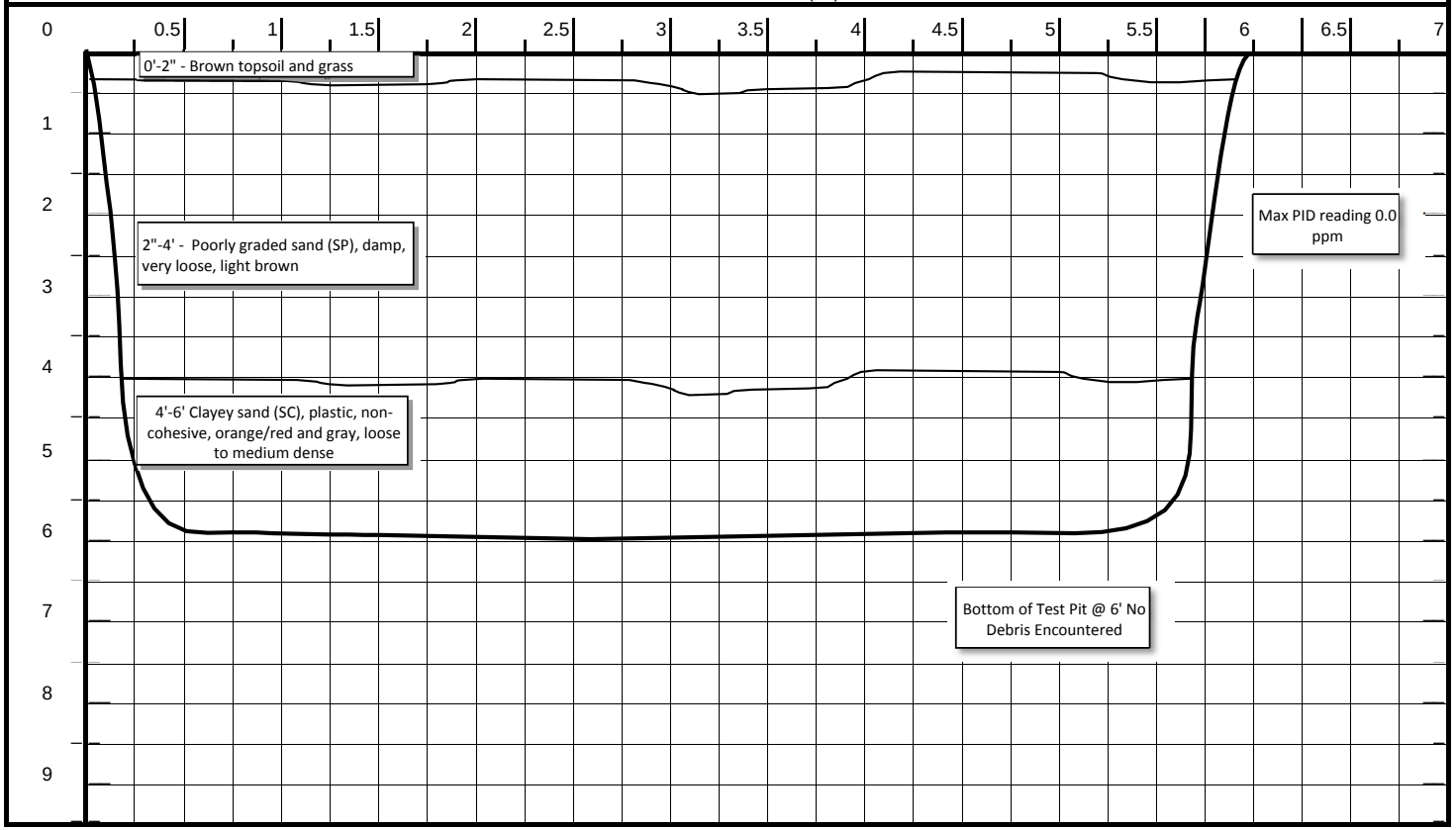
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP139** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

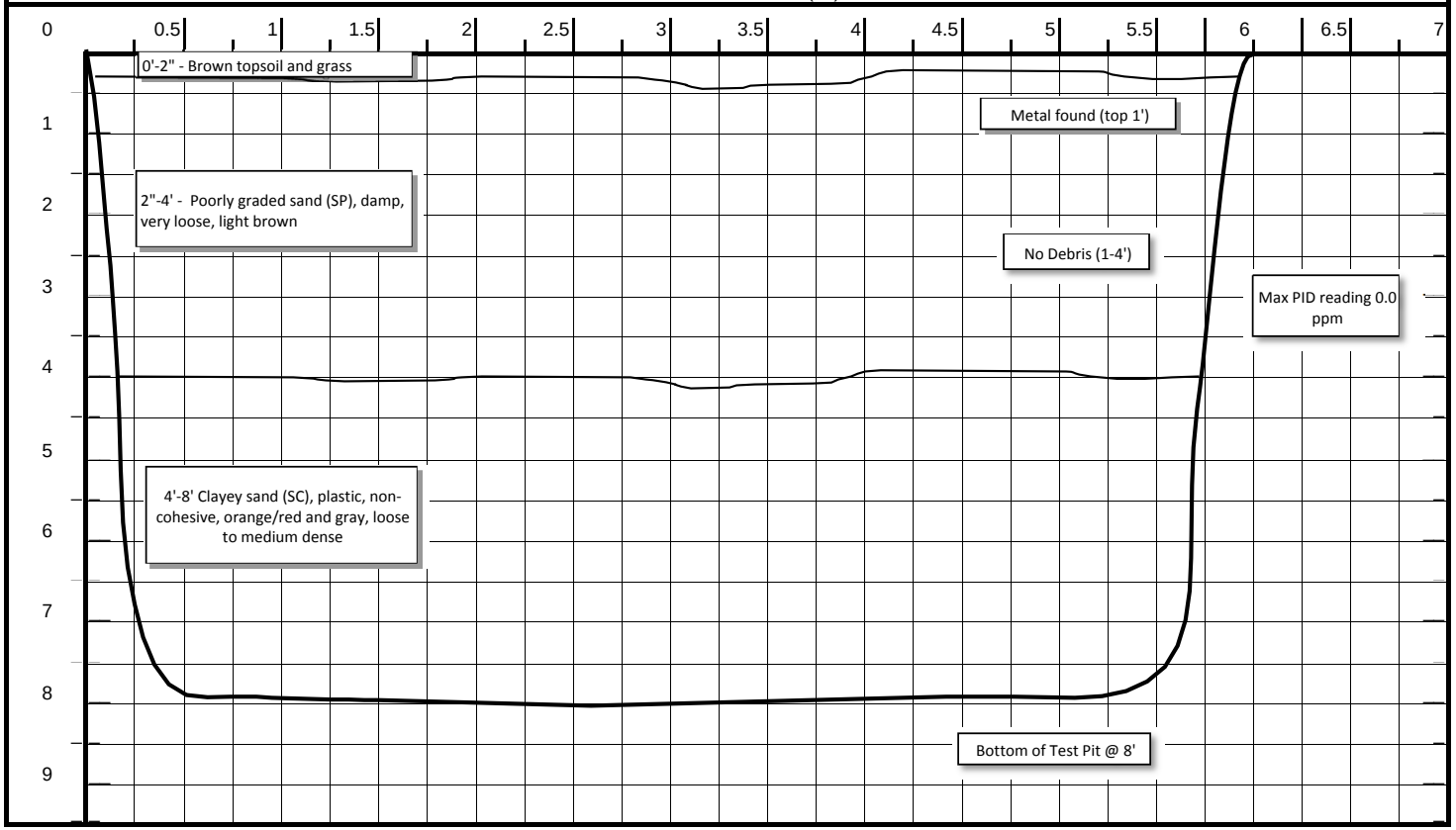
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 8 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP140** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

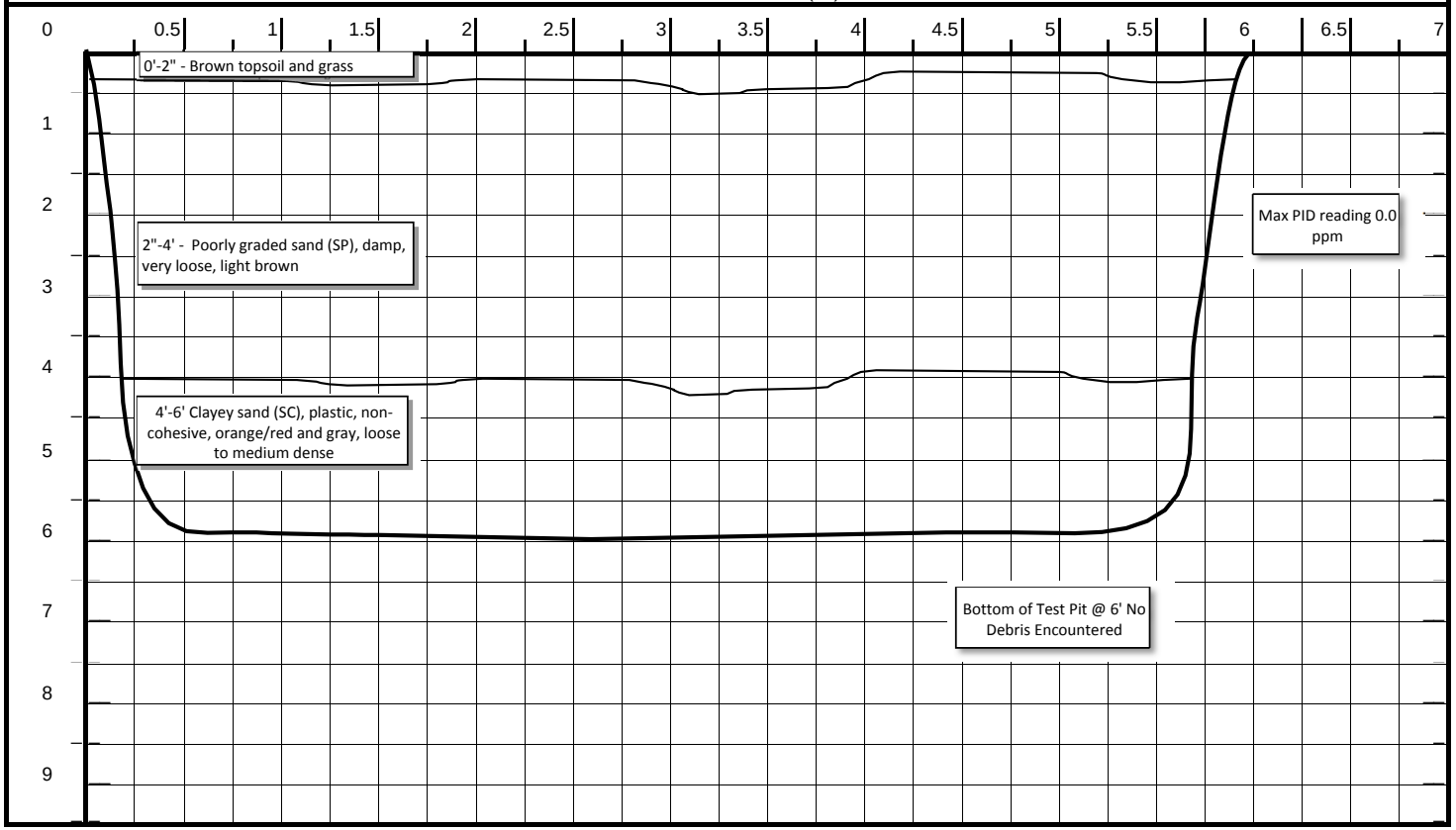
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP141** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

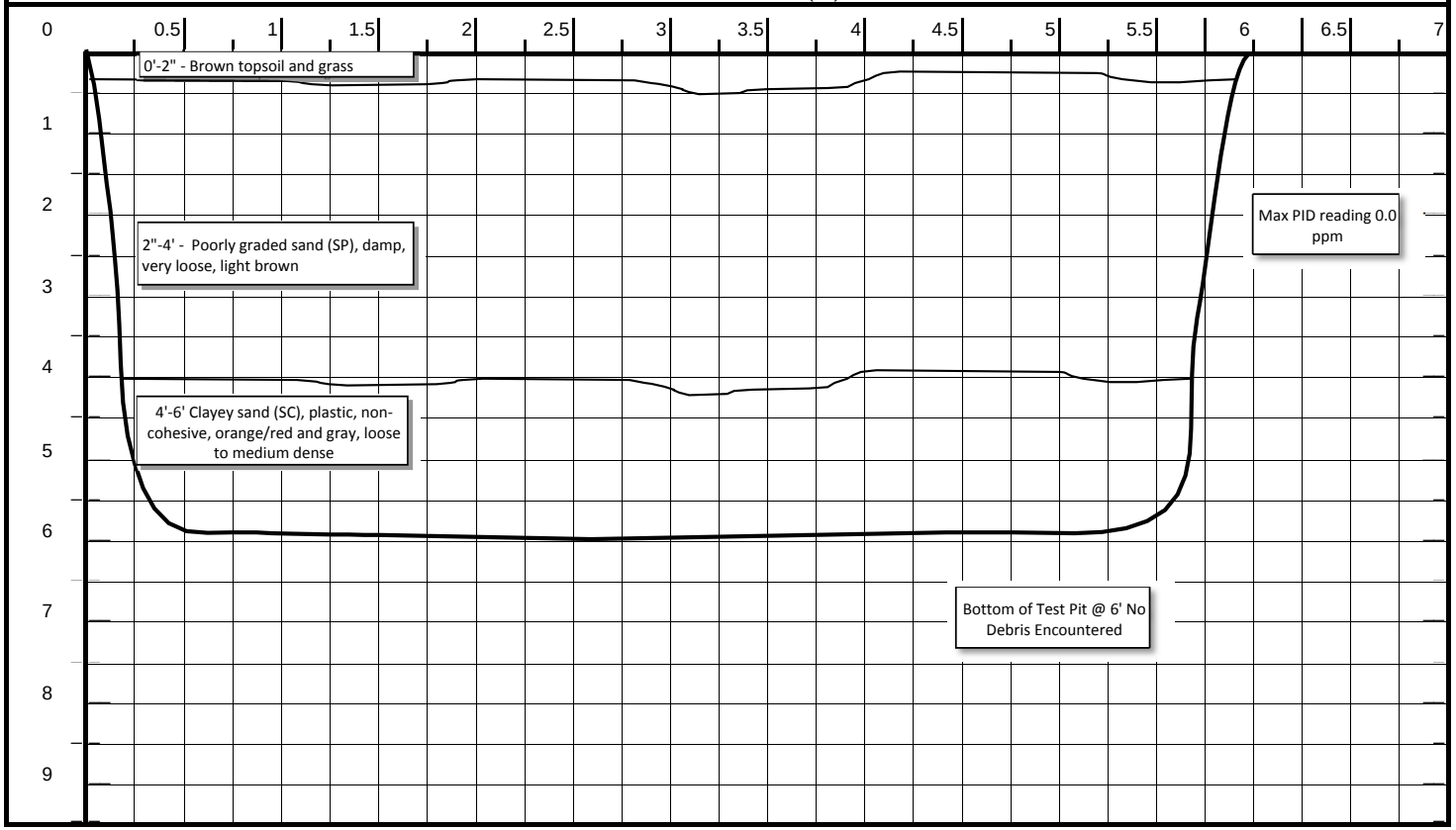
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP142** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

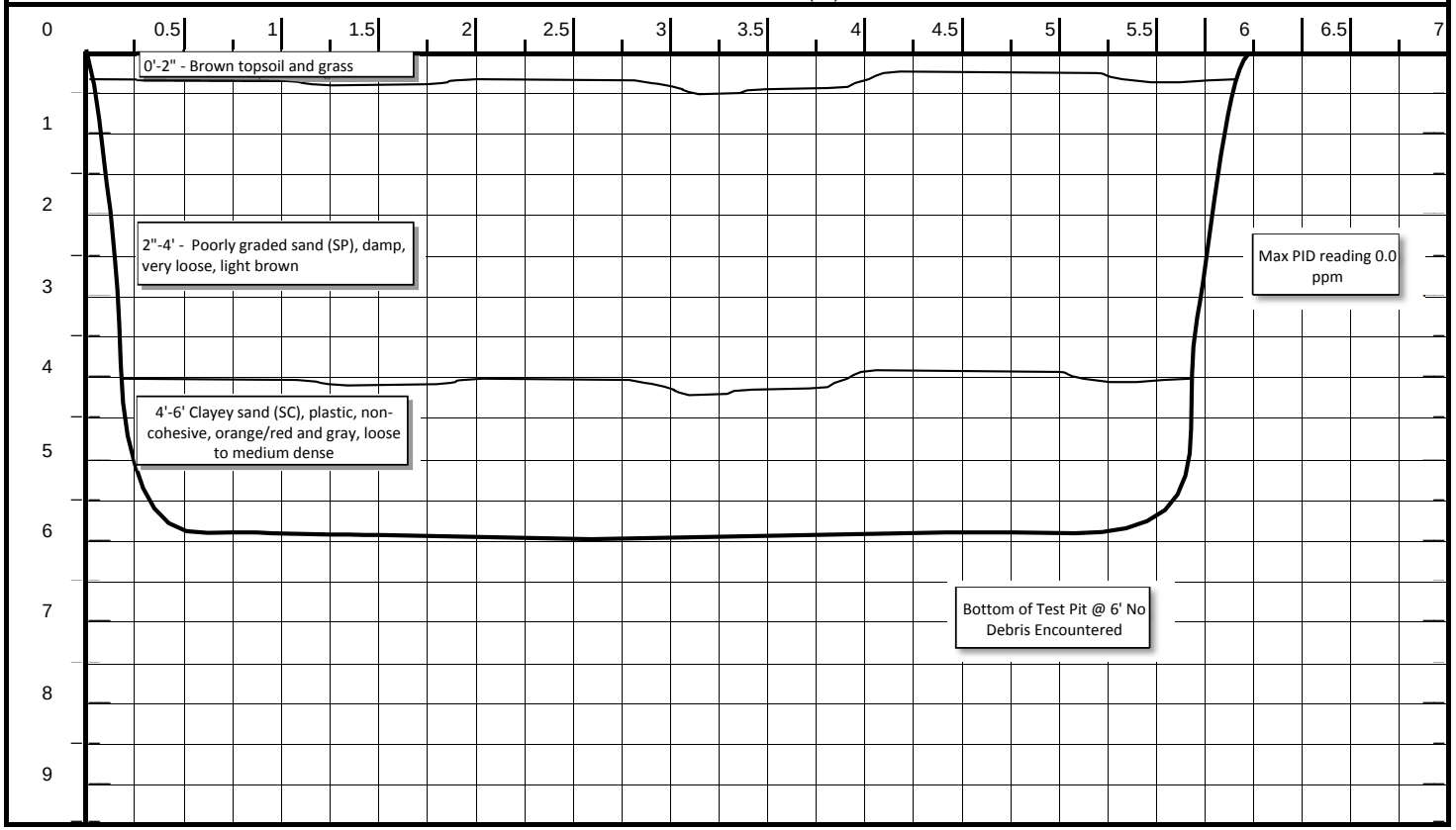
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP143** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

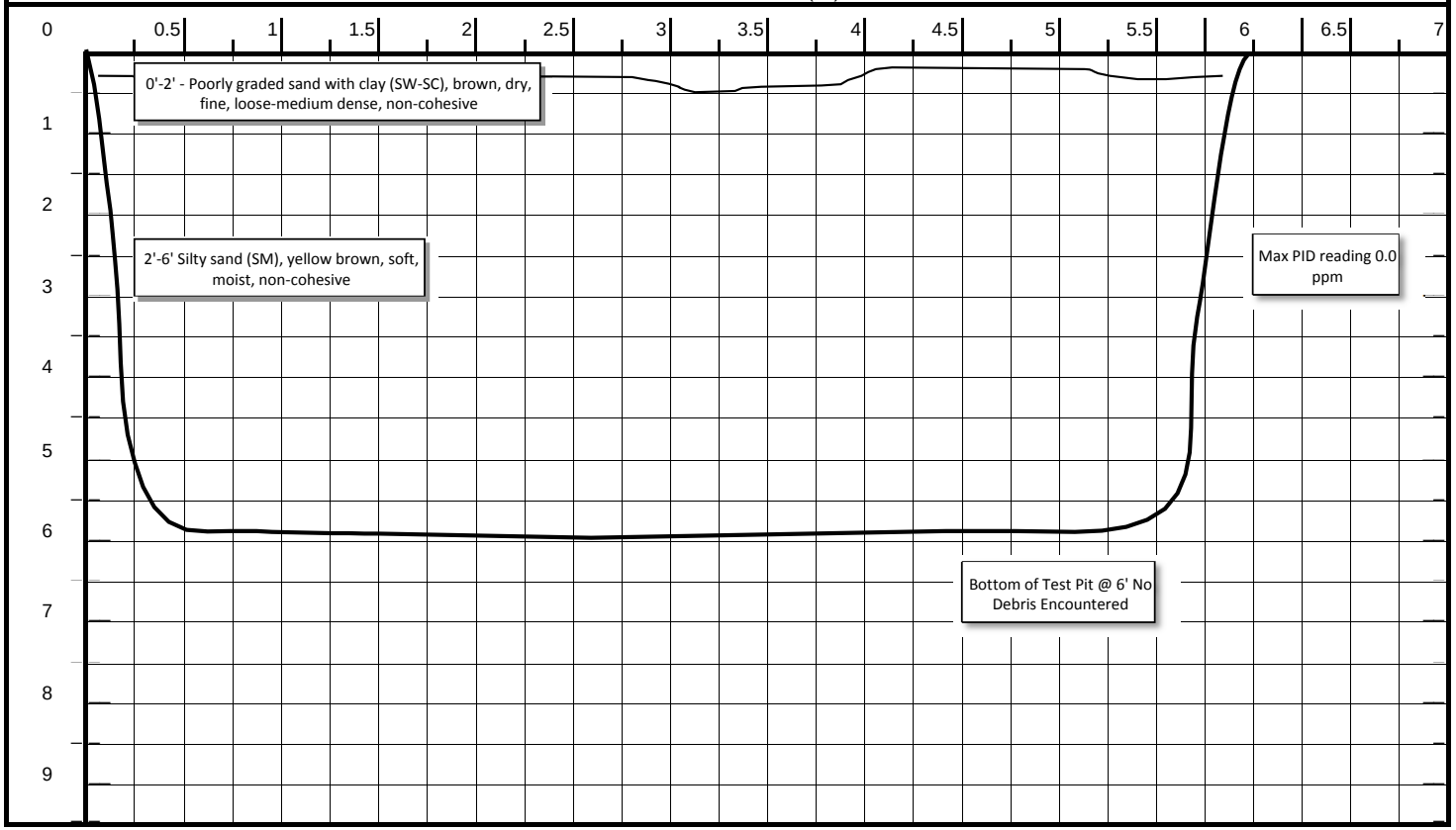
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP144** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

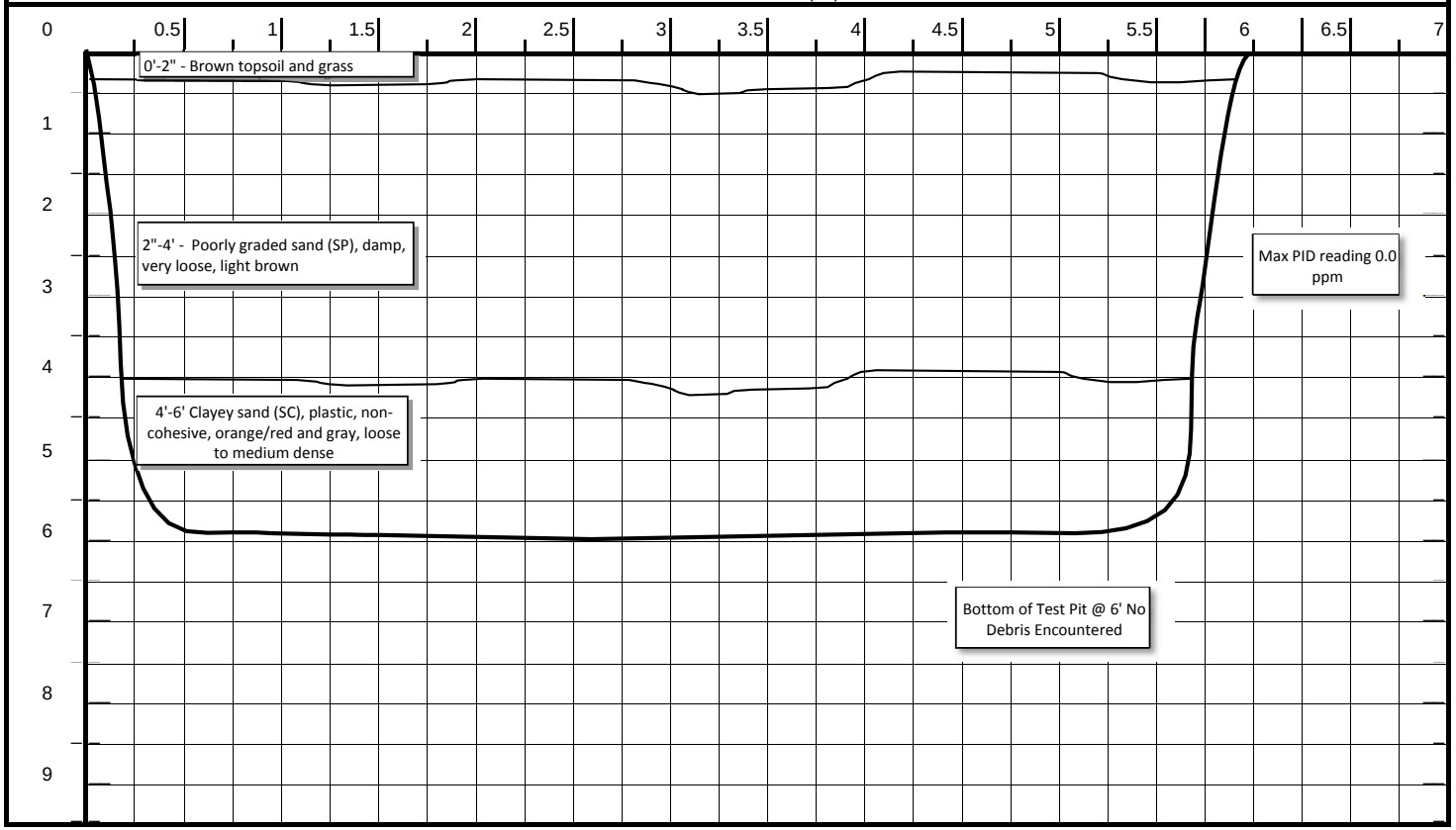
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP145** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

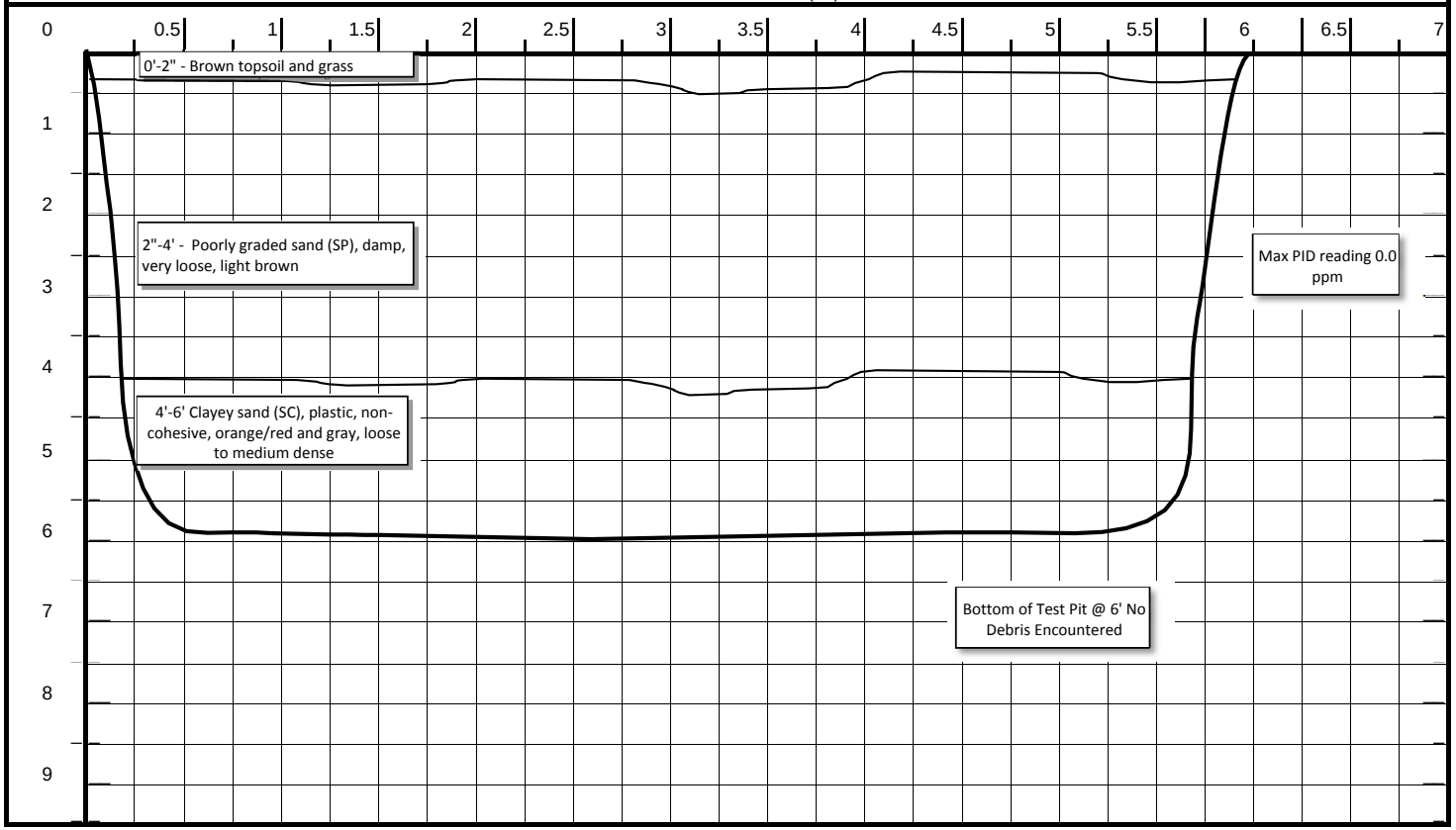
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TP146** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

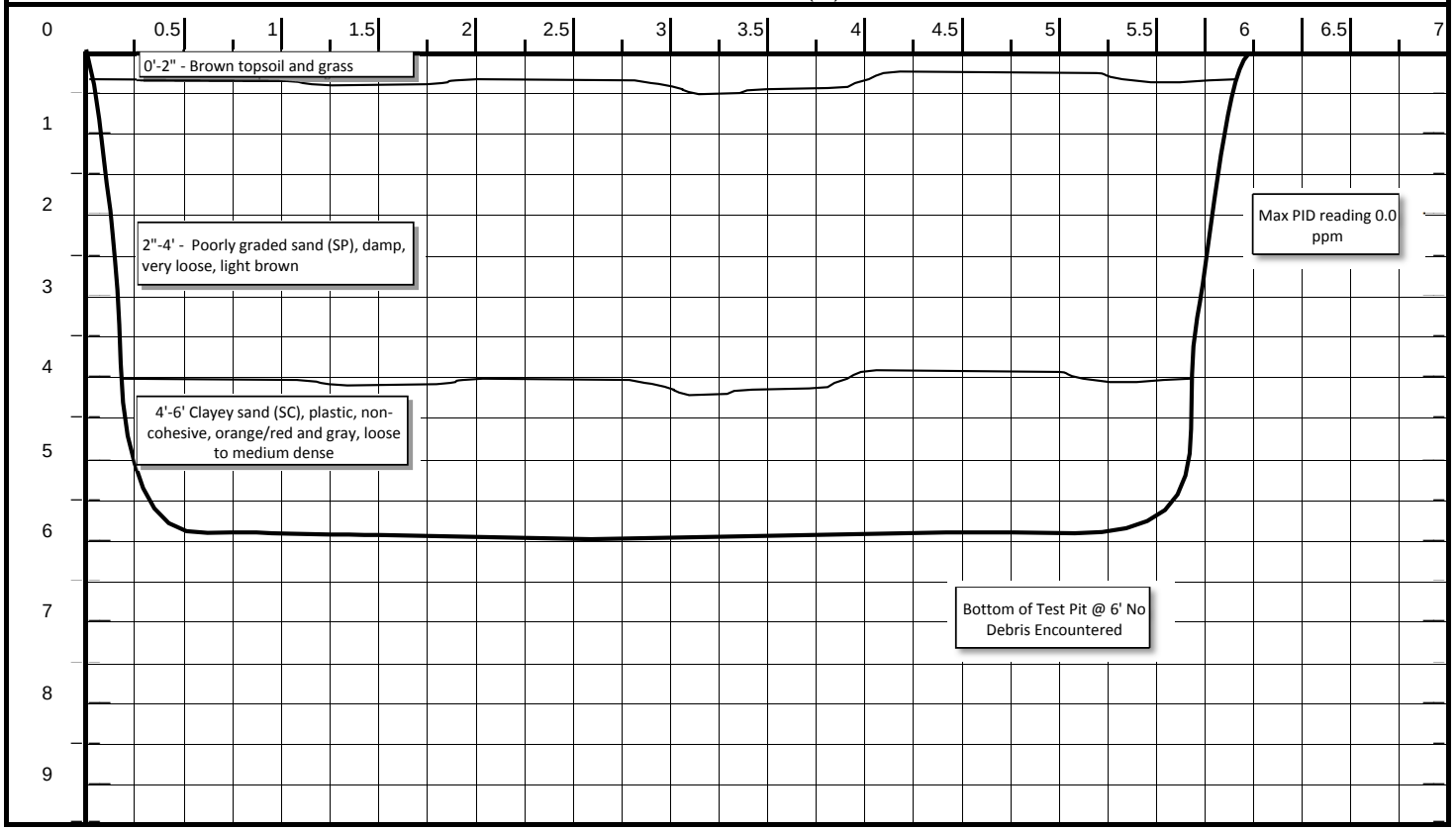
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/22/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPB1** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 LOCATION :Naval Weapons Station Yorktown LOGGER : Kimberley Coke

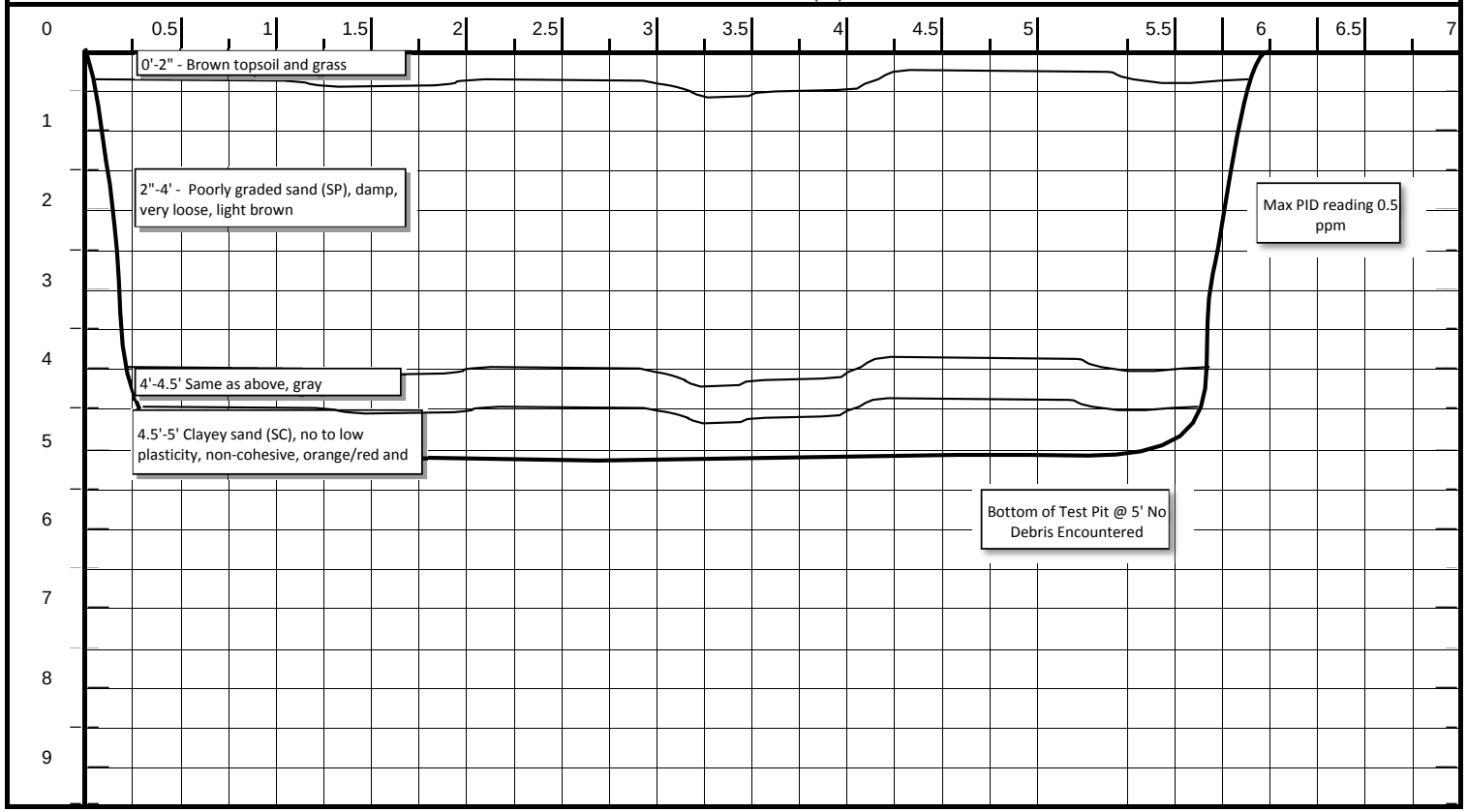
ELEVATION : Not Measured CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A APPROX. DIMENS: Length: 6 ft Width: 3 ft Max. Depth: 5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPB2** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

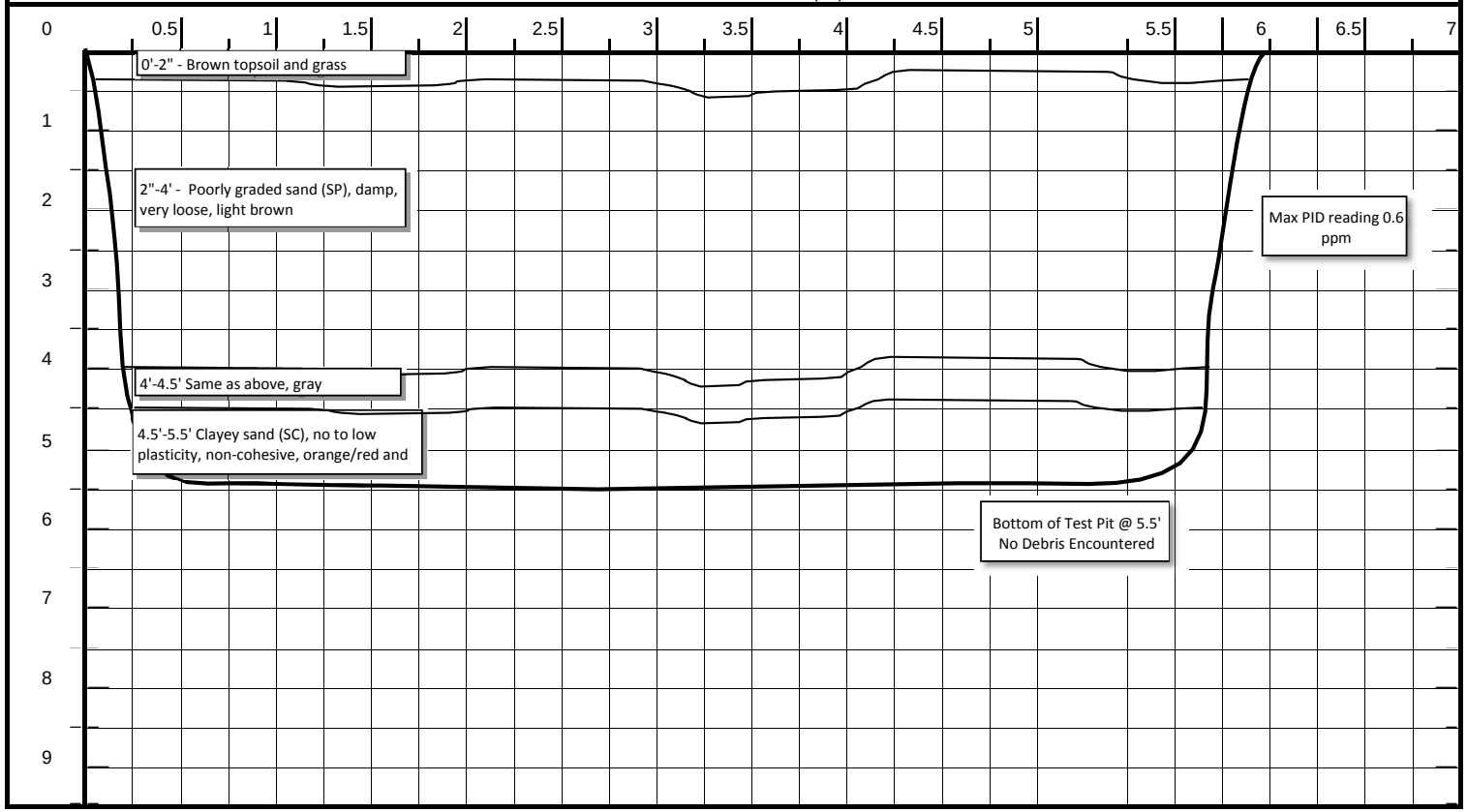
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPB3** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 LOCATION :Naval Weapons Station Yorktown LOGGER : Kimberley Coke

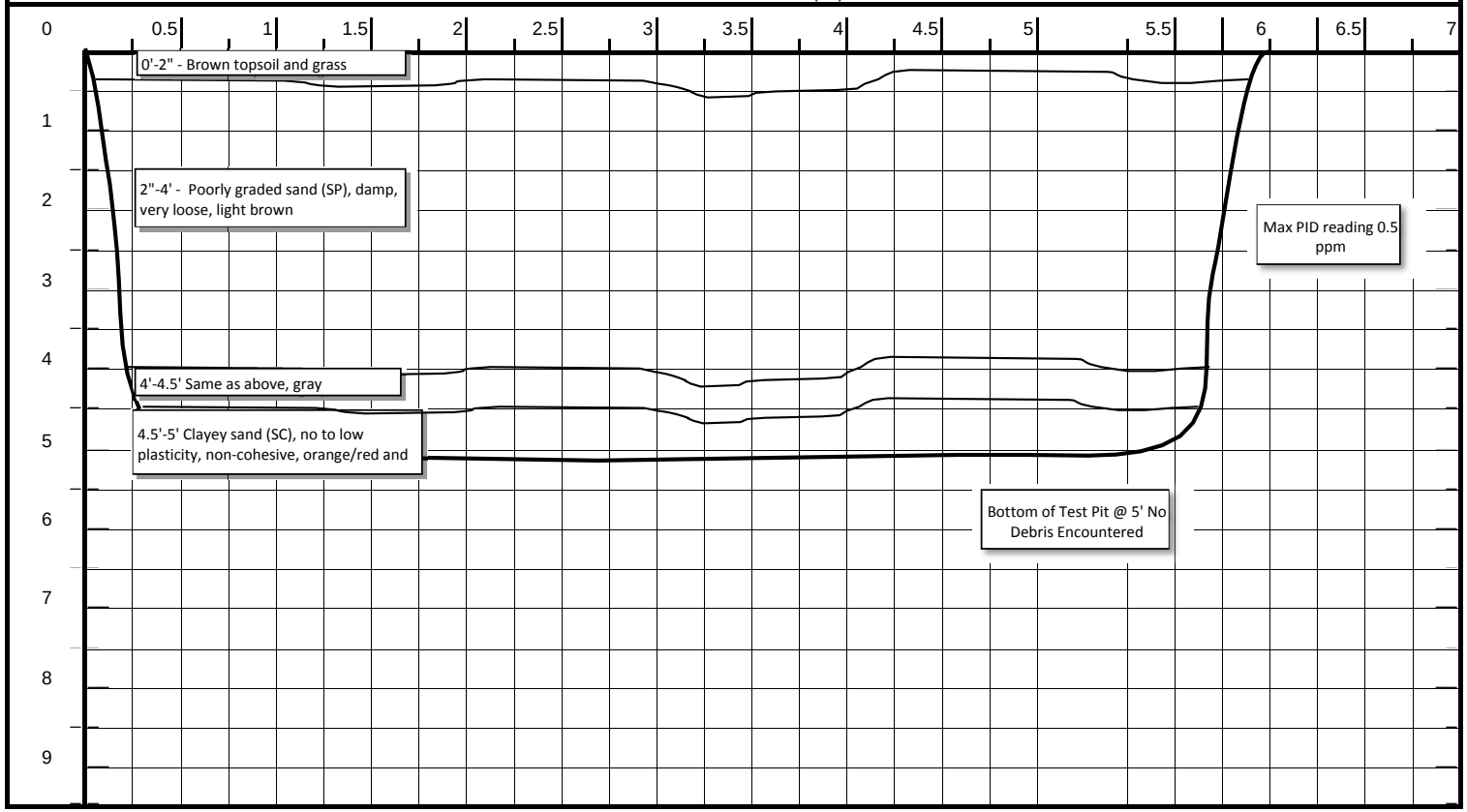
ELEVATION : Not Measured CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A APPROX. DIMENS: Length: 6 ft Width: 3 ft Max. Depth: 5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPC1** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

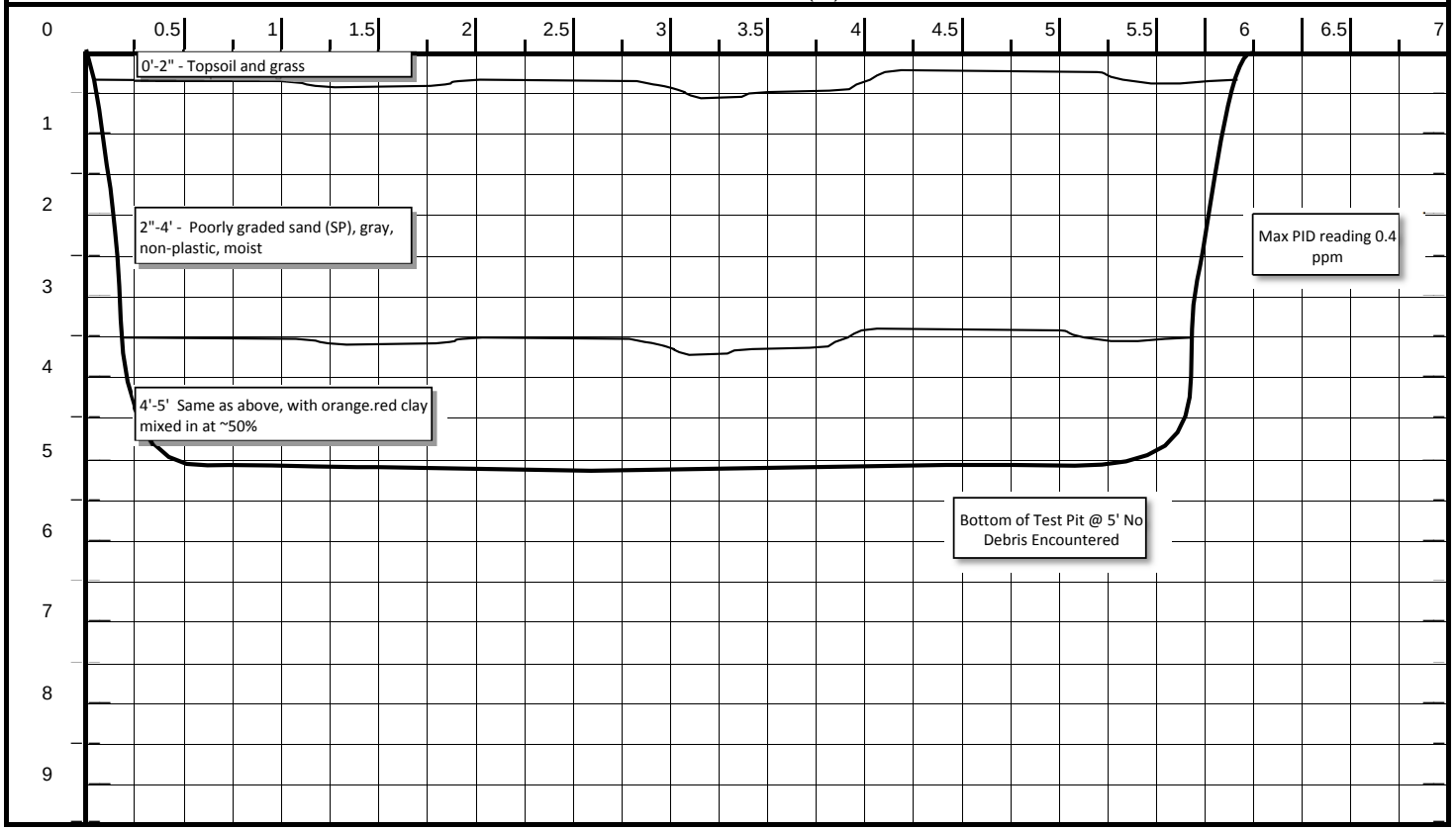
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPE1** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 LOCATION :Naval Weapons Station Yorktown LOGGER : Kimberley Coke

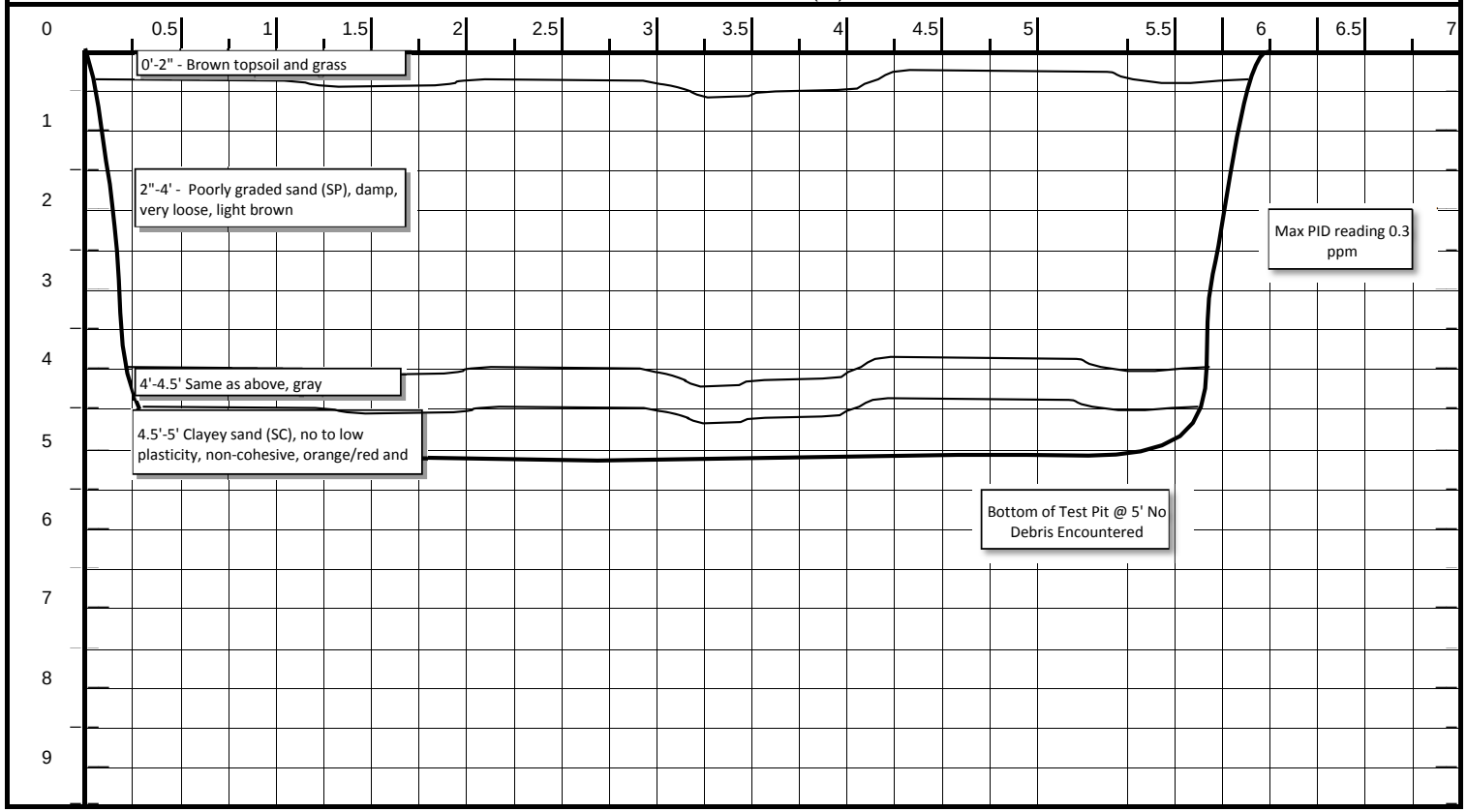
ELEVATION : Not Measured CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A APPROX. DIMENS: Length: 6 ft Width: 3 ft Max. Depth: 5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPE2** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 LOCATION :Naval Weapons Station Yorktown LOGGER : Kimberley Coke

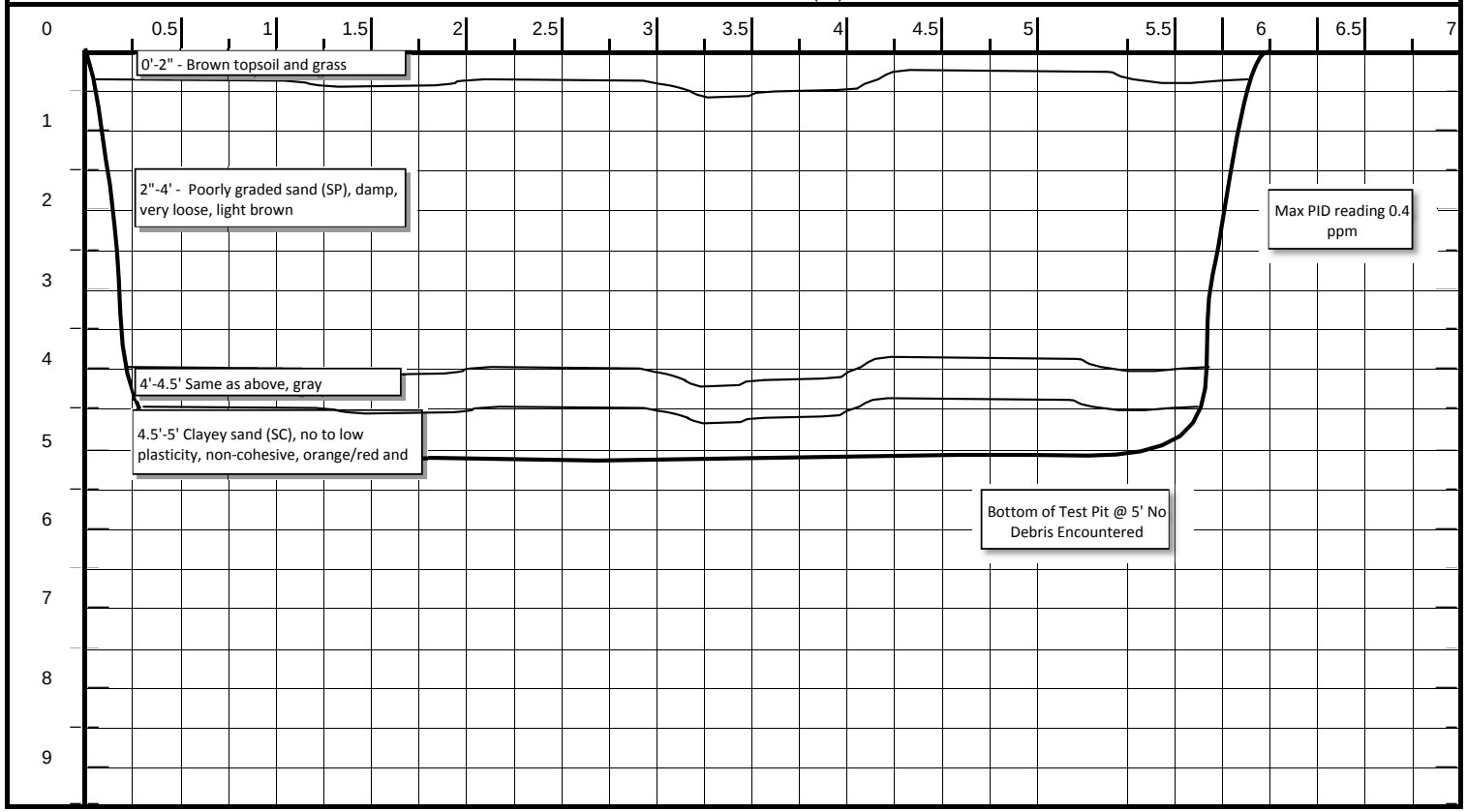
ELEVATION : Not Measured CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A APPROX. DIMENS: Length: 6 ft Width: 3 ft Max. Depth: 5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPE3** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

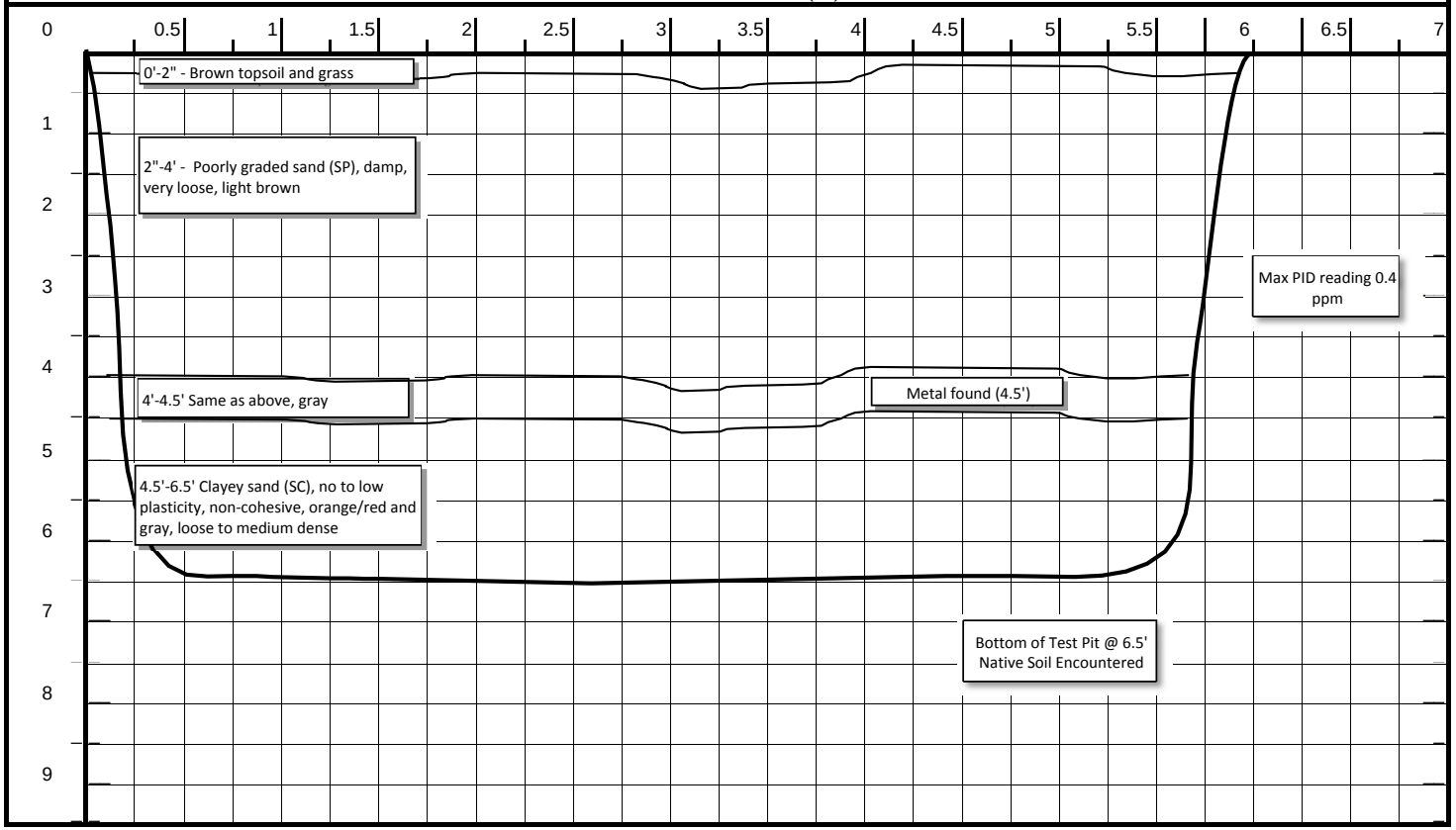
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Trackhoe | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6.5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPE4** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 LOCATION :Naval Weapons Station Yorktown LOGGER : Kimberley Coke

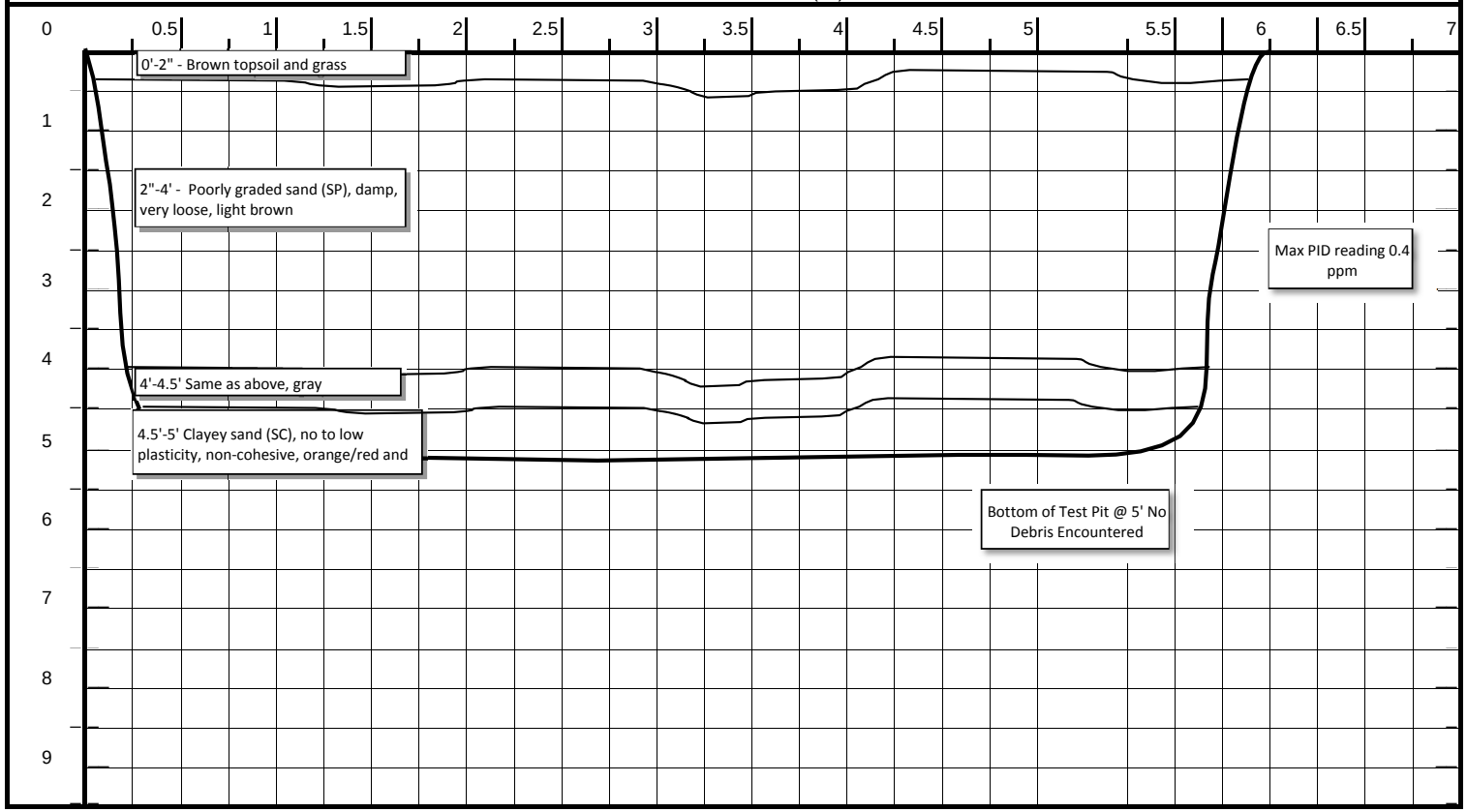
ELEVATION : Not Measured CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A APPROX. DIMENS: Length: 6 ft Width: 3 ft Max. Depth: 5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPE5** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 LOCATION :Naval Weapons Station Yorktown LOGGER : Kimberley Coke

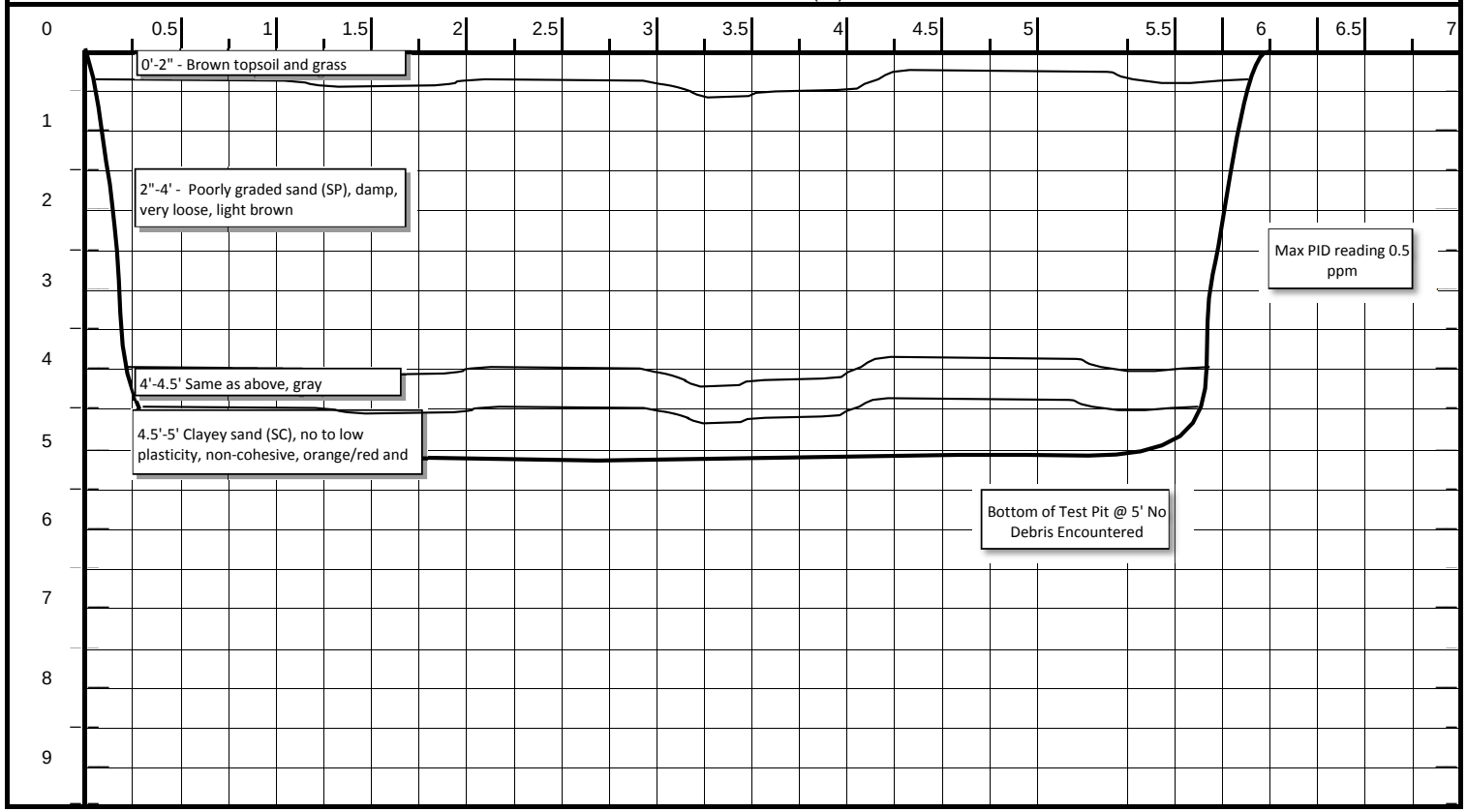
ELEVATION : Not Measured CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A APPROX. DIMENS: Length: 6 ft Width: 3 ft Max. Depth: 5 ft

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

TEST PIT DIMENSIONS (FT)



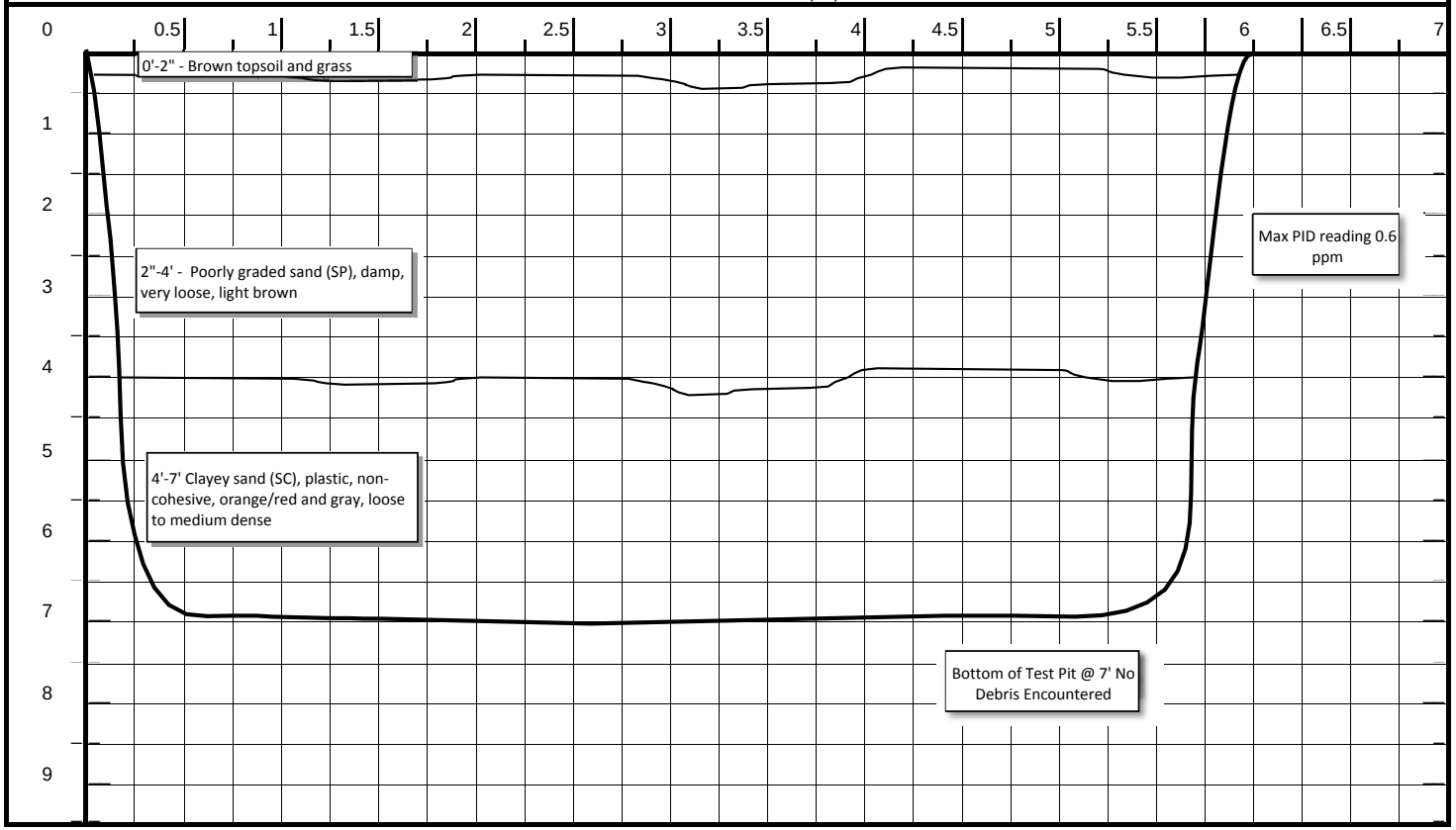
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TPF1** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Trackhoe		DATE EXCAVATED: 4/20/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 7 ft

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

TEST PIT DIMENSIONS (FT)



PROJECT NUMBER	TEST PIT NUMBER
364428.FI.FS	TPF2 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 LOCATION :Naval Weapons Station Yorktown LOGGER : Kimberley Coke

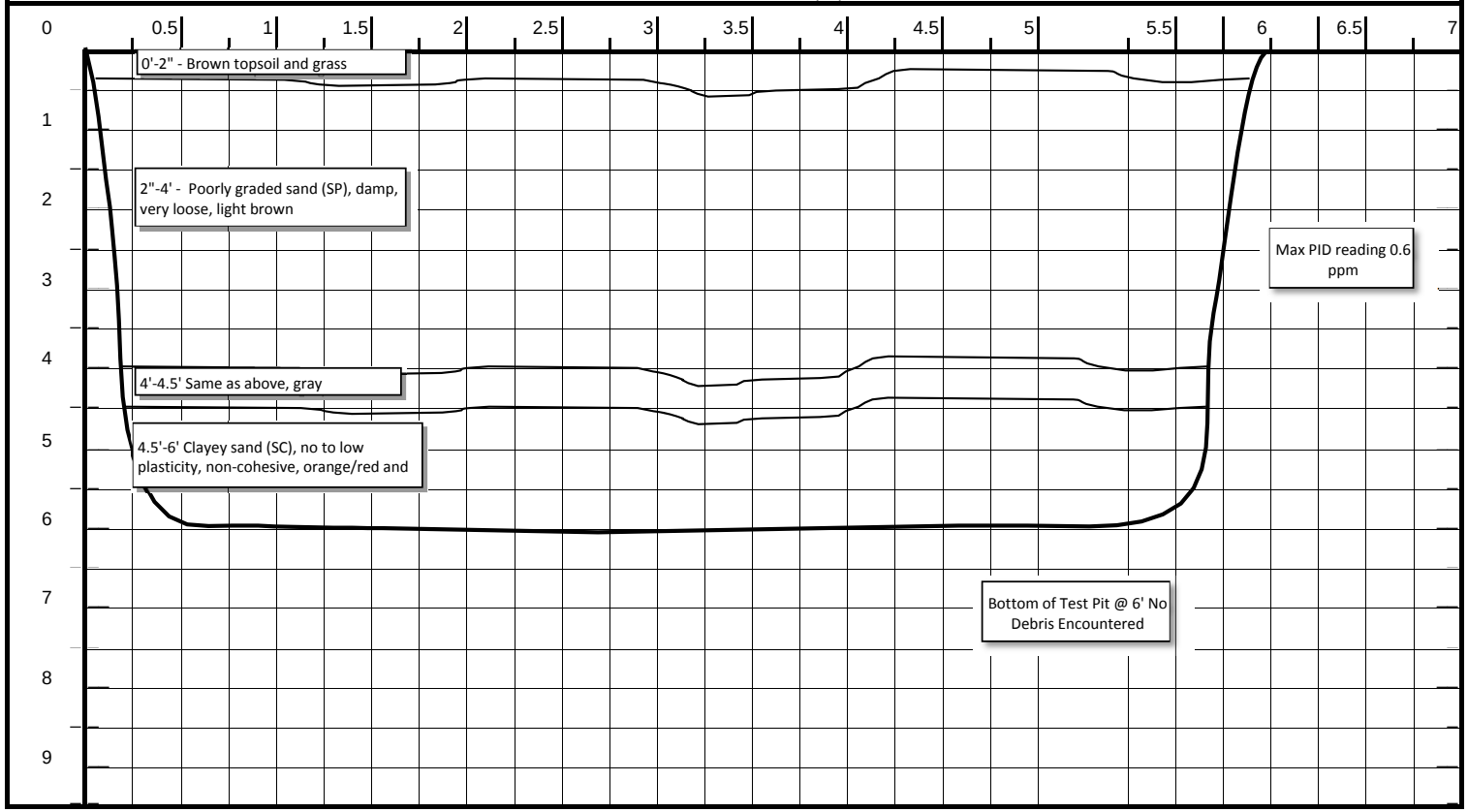
ELEVATION : Not Measured CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A APPROX. DIMENS: Length: 6 ft Width: 3 ft Max. Depth: 5 ft

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

TEST PIT DIMENSIONS (FT)



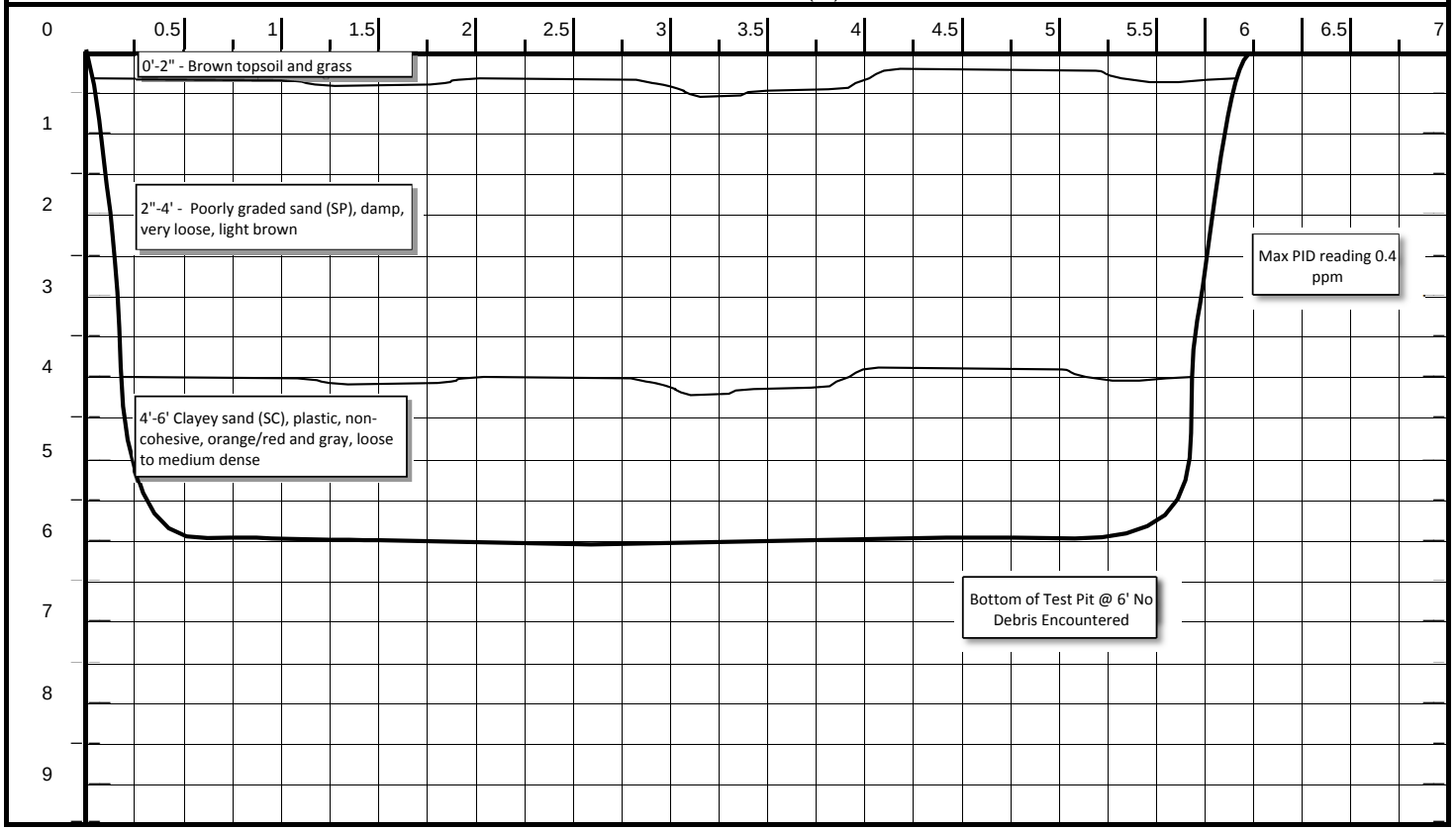
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB10** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Trackhoe		DATE EXCAVATED: 4/20/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB11** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

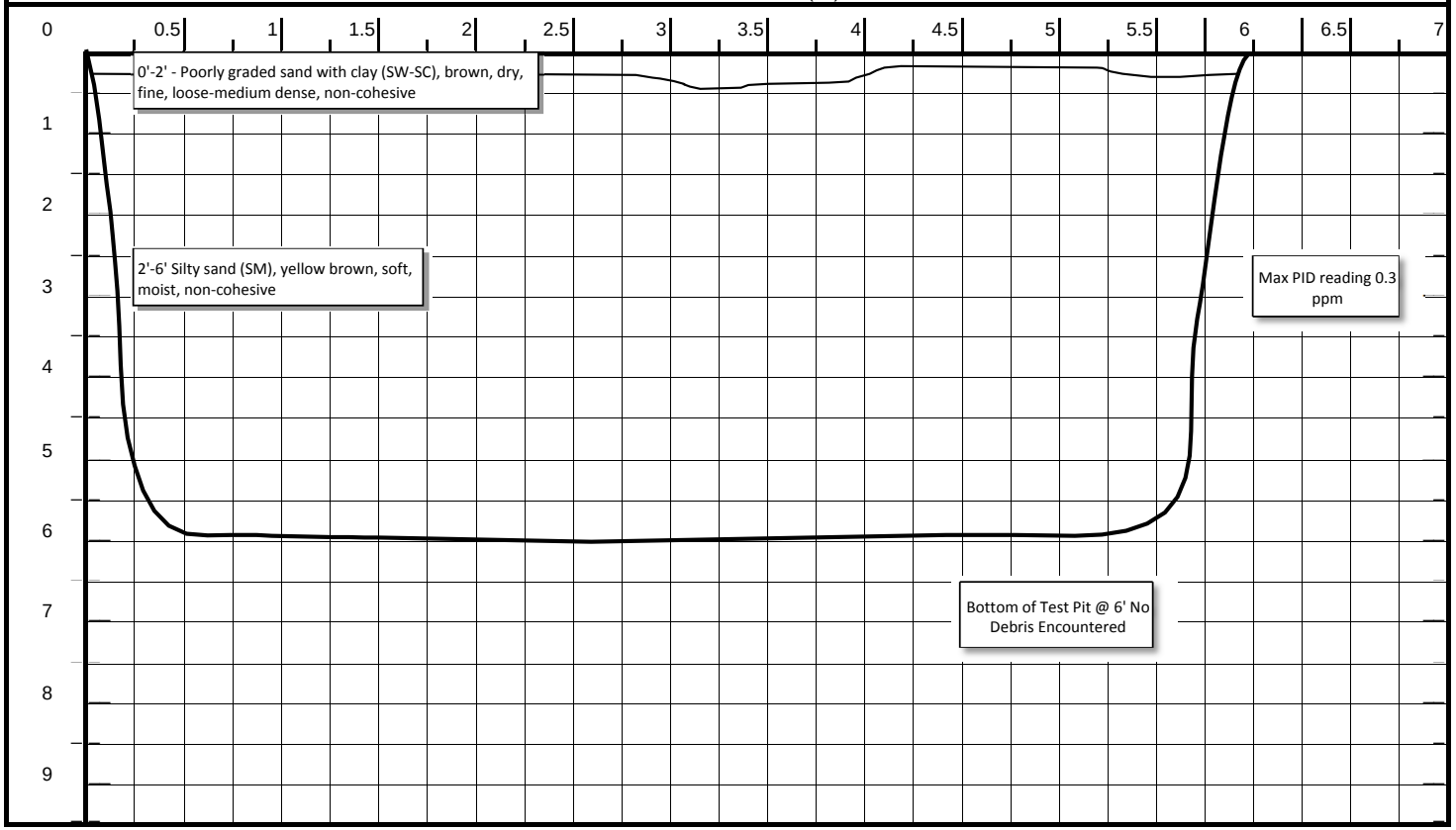
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Trackhoe | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB12** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

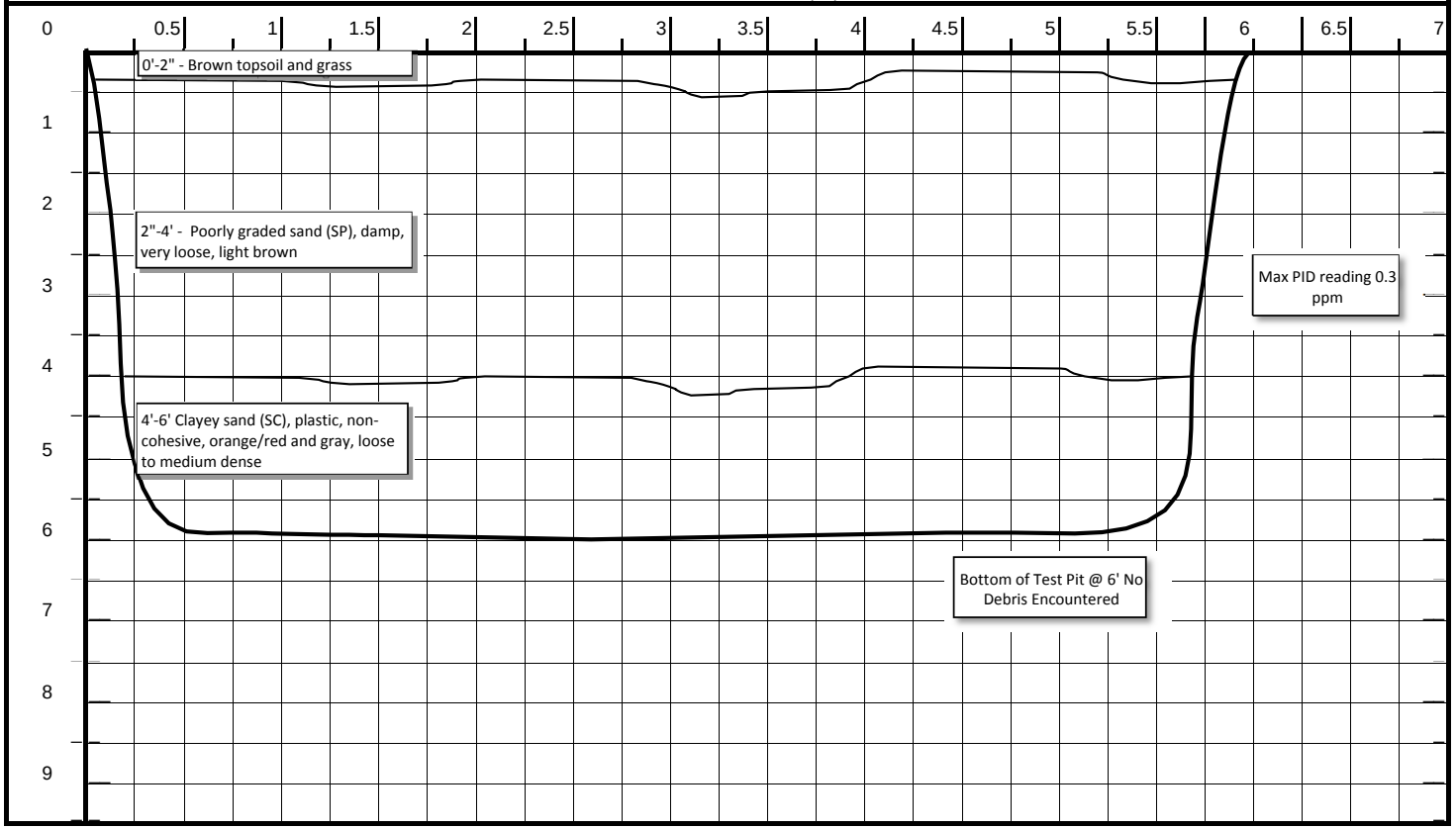
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Trackhoe | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB13** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

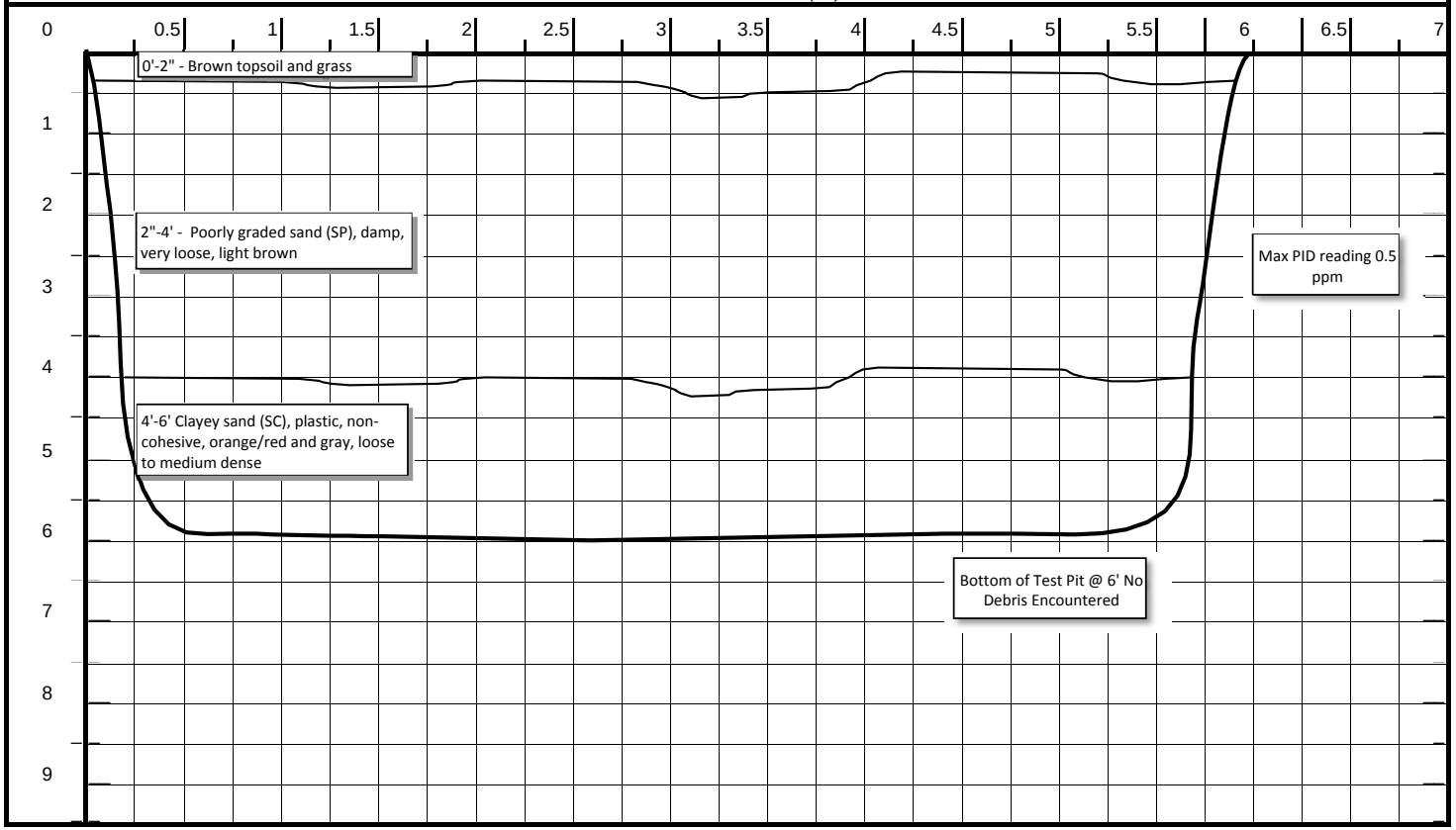
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Trackhoe | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

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

TEST PIT DIMENSIONS (FT)



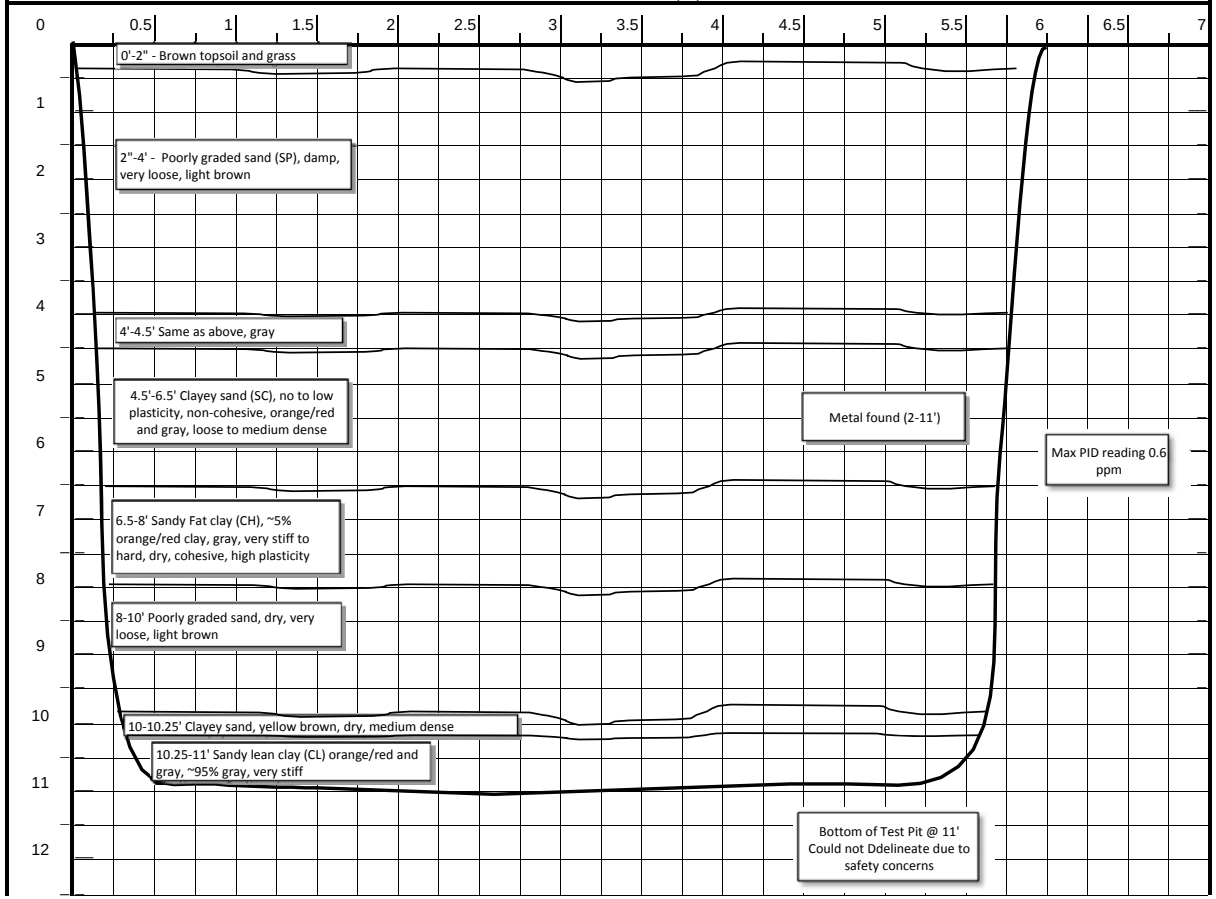
CH2MHILL	PROJECT NUMBER 364428.FI.FS	TEST PIT NUMBER TPSB14 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Bobcat Excavator 442		DATE EXCAVATED: 4/20/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 11 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB15** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

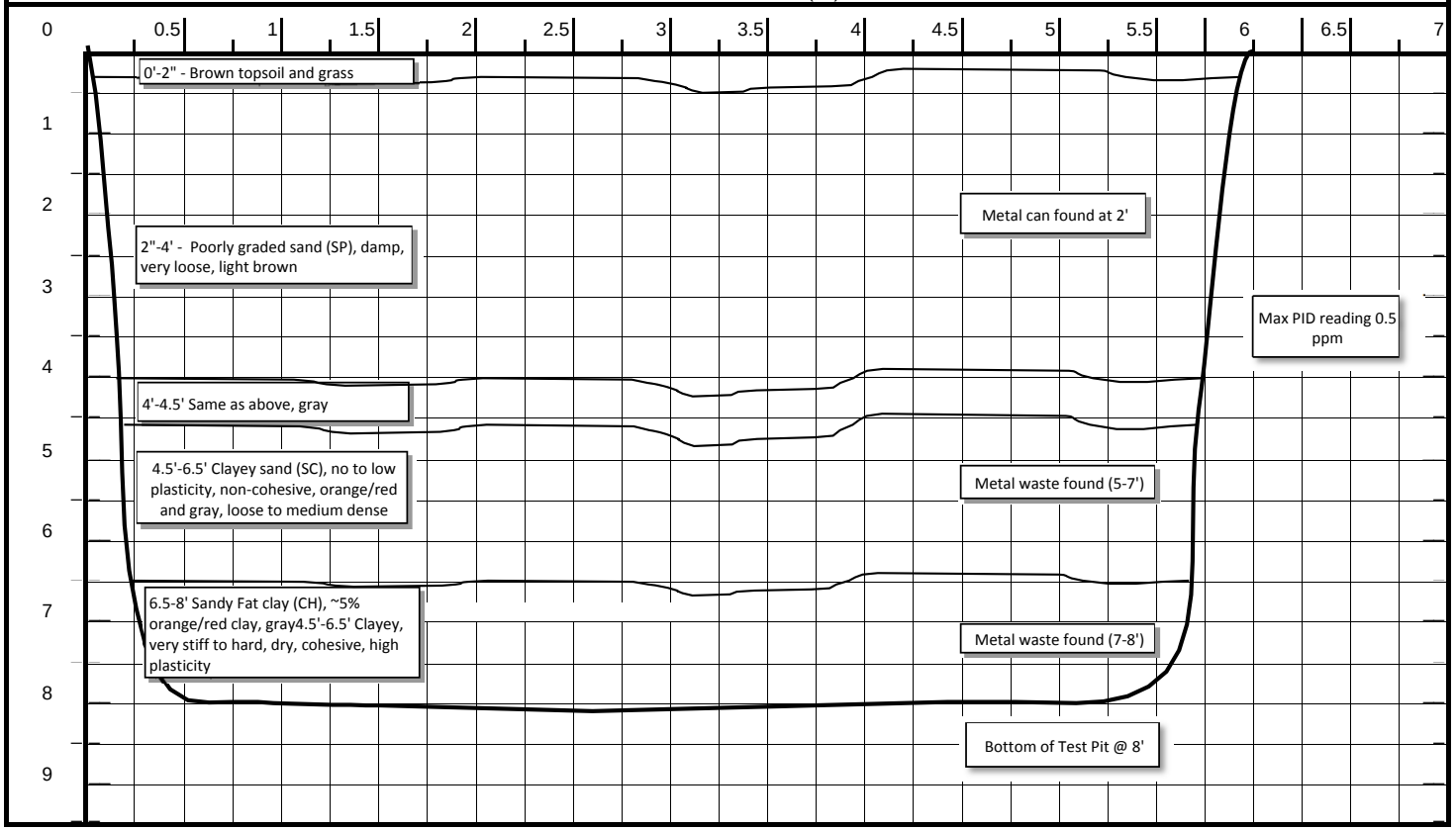
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 8 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB16** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

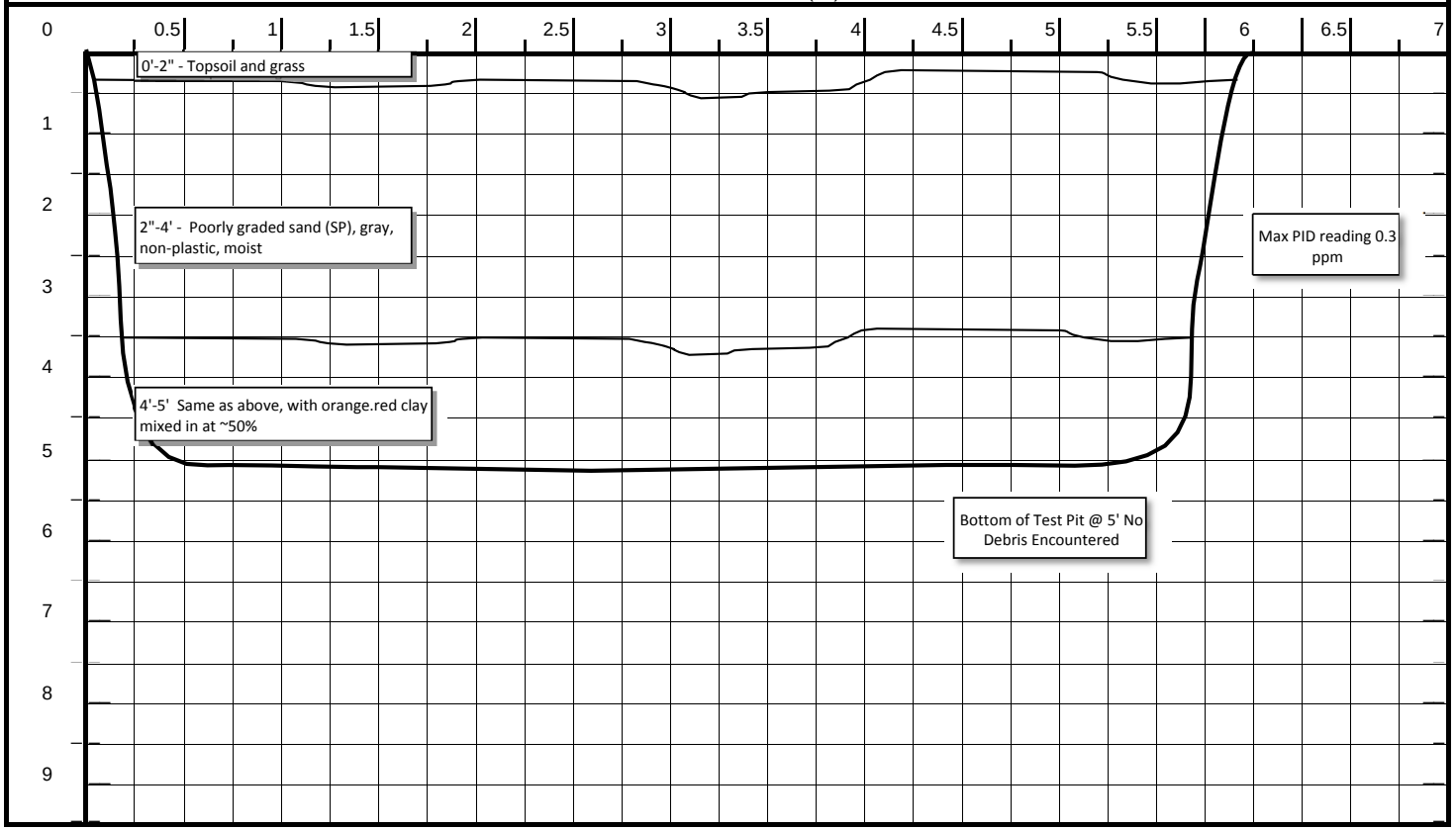
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 5 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB17** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

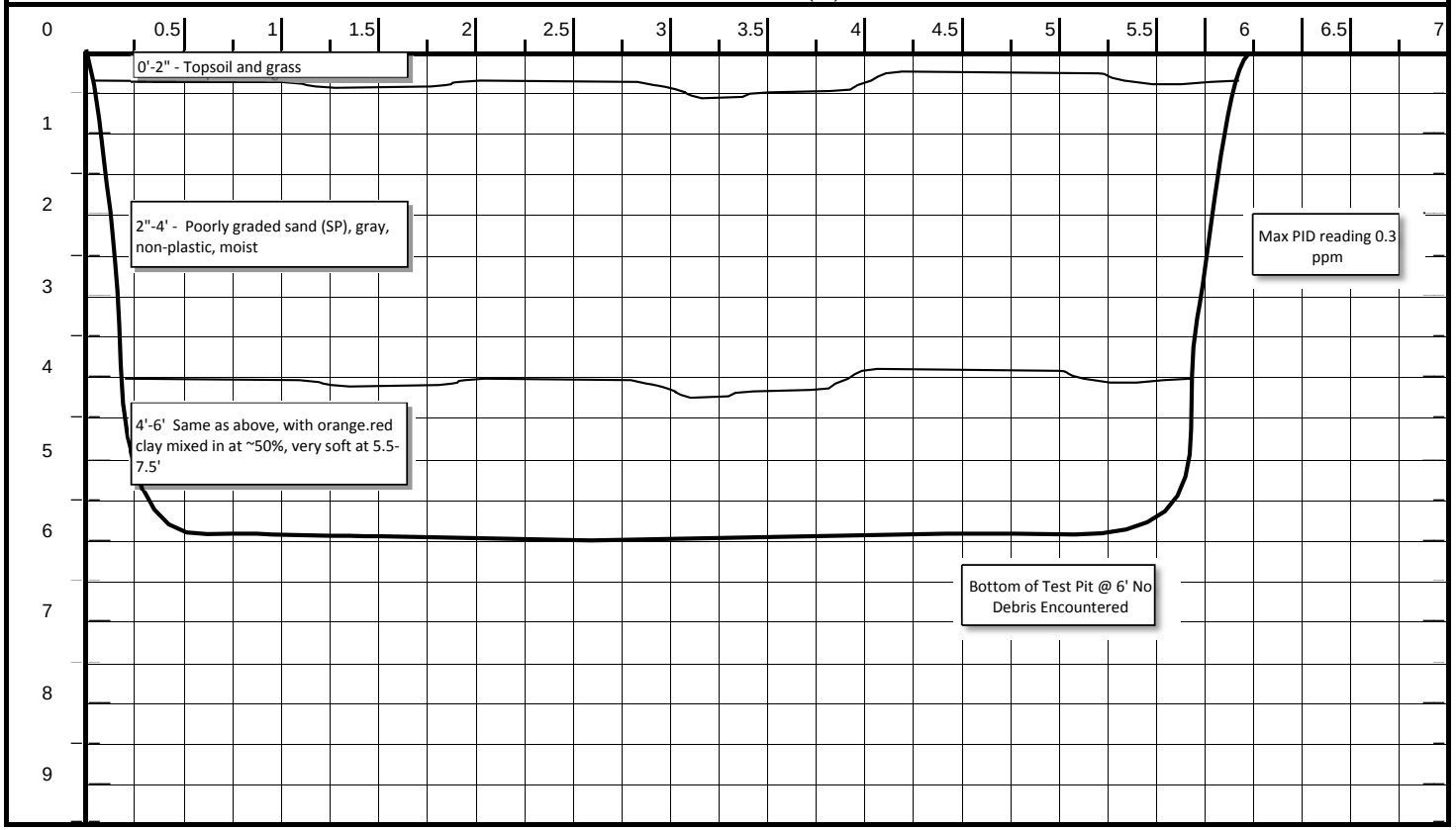
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB18** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

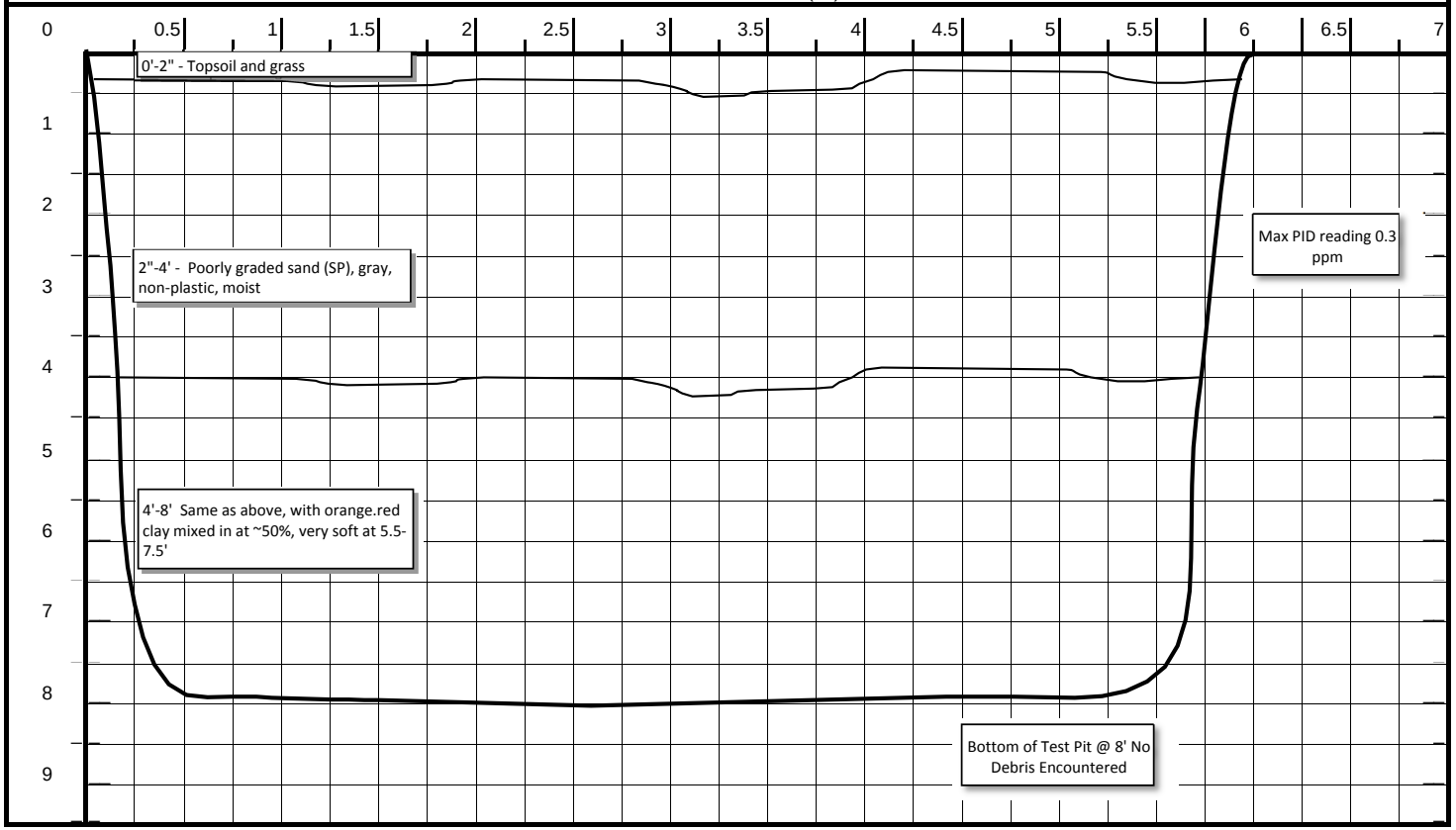
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 8 ft

DESCRIPTION	COMMENTS
(I.E., SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	(I.E., 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** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB19** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24 | LOCATION :Naval Weapons Station Yorktown | LOGGER : Kimberley Coke

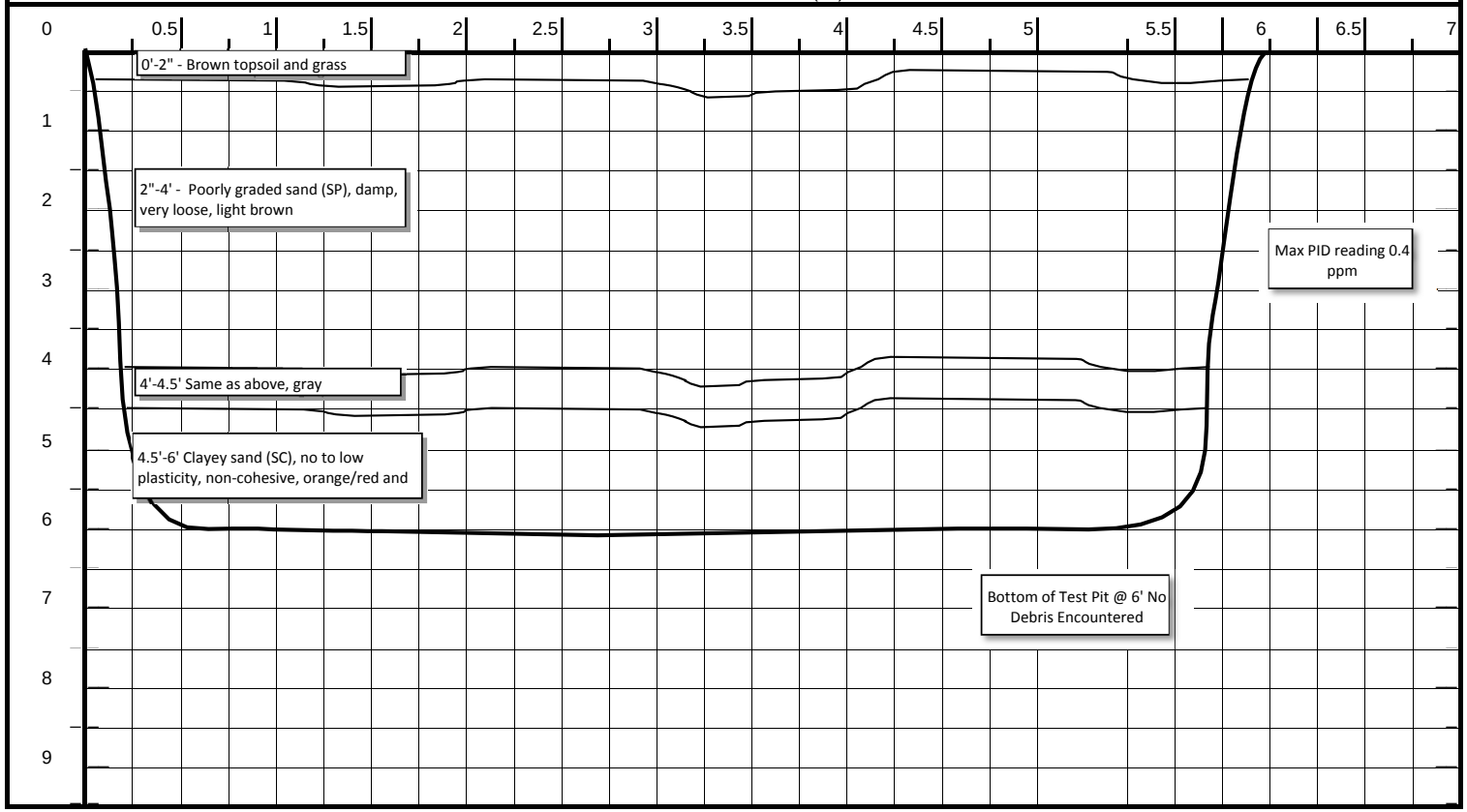
ELEVATION : Not Measured | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Bobcat Excavator 442 | DATE EXCAVATED: 4/20/10

WATER LEVEL : N/A | APPROX. DIMENS: Length: 6 ft | Width: 3 ft | Max. Depth: 6 ft

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

TEST PIT DIMENSIONS (FT)



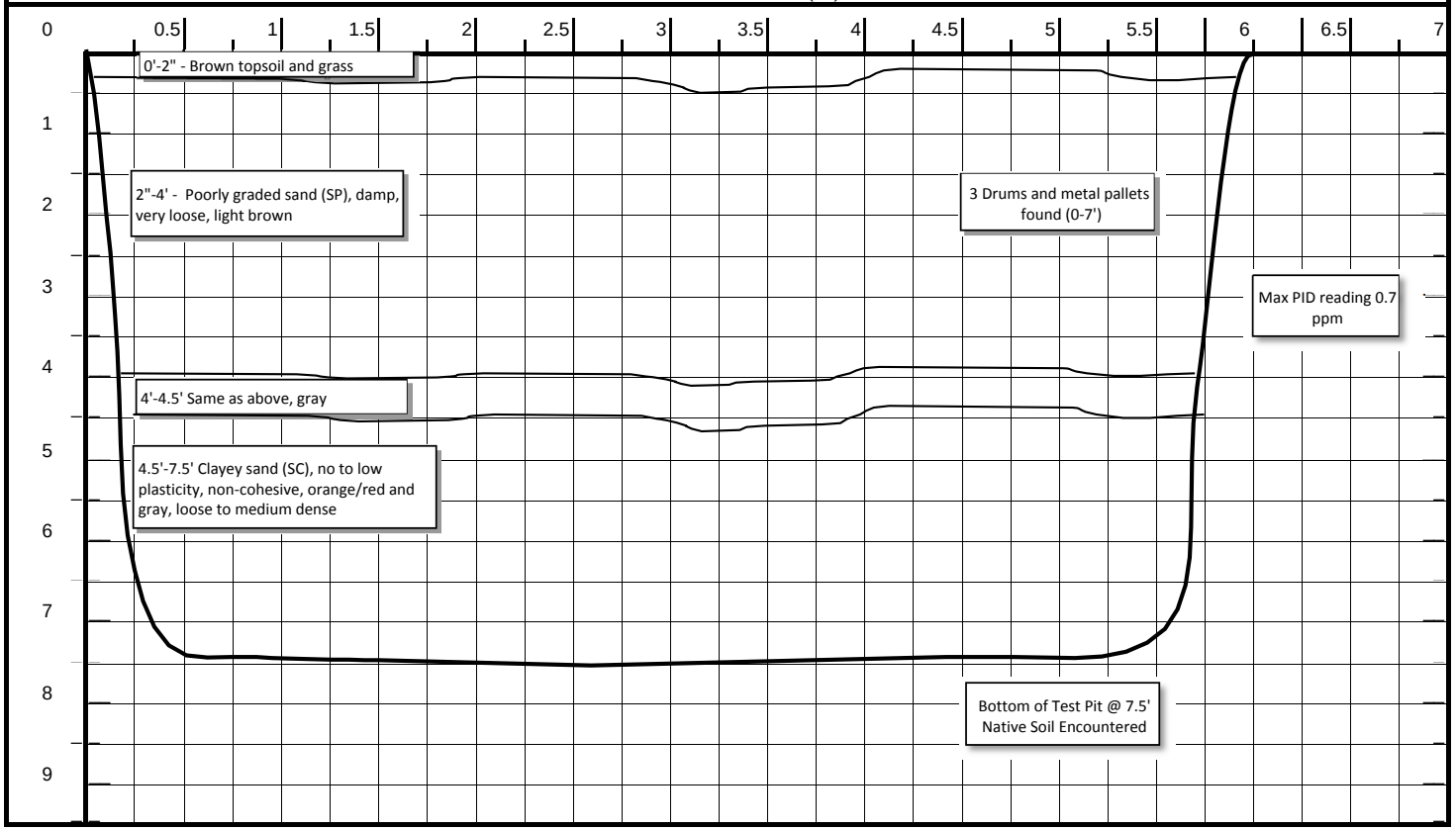
CH2MHILL	**PROJECT NUMBER** **364428.FI.FS**	**TEST PIT NUMBER** **TPSB20** SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 24	LOCATION :Naval Weapons Station Yorktown	LOGGER : Kimberley Coke
ELEVATION : Not Measured	CONTRACTOR : Parratt-Wolff, Inc.	
EXCAVATION EQUIPMENT USED : Bobcat Excavator 442		DATE EXCAVATED: 4/20/10
WATER LEVEL : N/A	APPROX. DIMENS: Length: 6 ft Width: 3 ft	Max. Depth: 7.5 ft

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

TEST PIT DIMENSIONS (FT)



Appendix C
Photographic Log

Test Pit SB20 –Liquid from a 55 gallon drum, no odor (North)

Test Pit SB20 – Drums and metal pallets (North East)

Test Pit SB20 – Arrow depicts "blue soil" that resembles battery acid (North)

Test Pit SB15 – Metal Waste (North)

Test Pit SB15 – Metal Waste ~5-7′ down bulging into excavation (North)

Test Pit SB14 – Metal Waste ~4-5′ down (North East)

Test Pit SB14 – Metal Waste (North East)

Test Pit SB14 – Metal Waste found ~8-10′ down showing cave in along the bottom edges. (North East)

Test Pit SB14 – Metal Waste excavated out of test ~2.5′ high (Scale is a 5′5″ FTM) (North East)

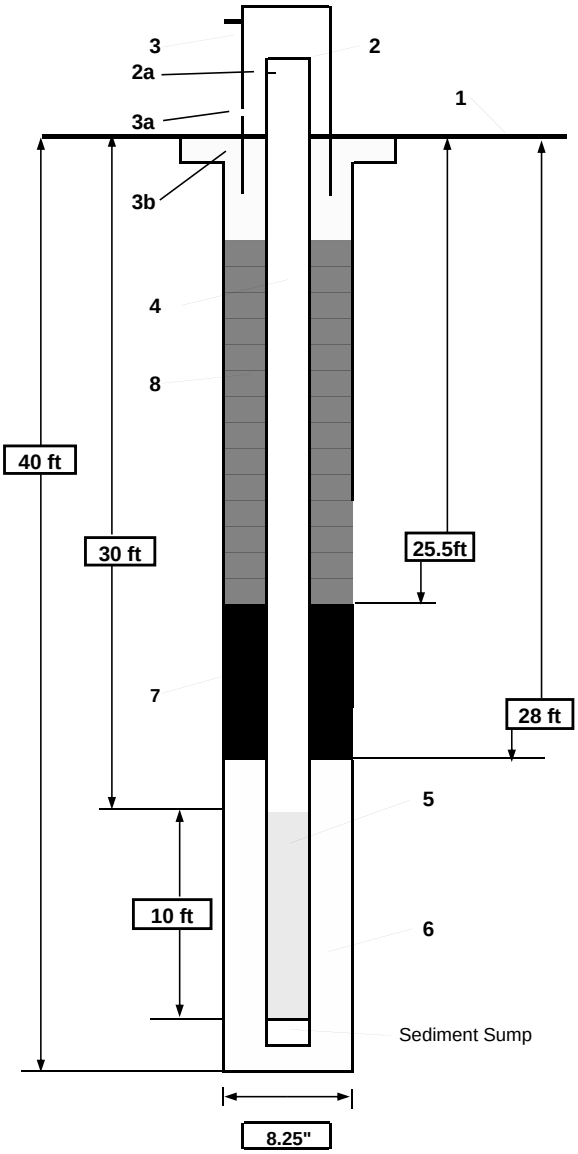
Test Pit SB14 – Sample location at ~11′ down into clay (any more excavating the hole may have caved in, unsafe) (North East)

Appendix D
Monitoring Well Construction Diagrams

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-01	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24
DRILLING CONTRACTOR : Parratt Wolff
DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8.25" (Casing)
WATER LEVELS : #### START : April 26th 2010 END: April 27th 2010 LOGGER : Kimberley Coke



NOTE: Diagram is not to scale.

1-	Ground elevation at well	28.51
2-	Top of casing elevation	Ground surface to 22.5 feet
	a) vent hole?	No
3-	Wellhead protection cover type	4 Bollards
	a) weep hole?	
	b) concrete pad dimensions	3' x 3'
4-	Diameter/type of well casing	2" PVC
5-	Type/slot size of screen	Machine slotted 0.010 inch
6-	Type screen filter	DSI #1 sand
	a) Quantity used	7 bags
7-	Type of seal	3/8 bentonite plug
	a) Quantity used	3/4 - 1 bag
8-	Grout	
	a) Grout mix used	94 pound Portland Cement
	b) Method of placement	Bucket NM
	Development method	
	Development time	
	Estimated purge volume	

Comments Total Well Depth (BTOC) = 40 ft.
Final Well Development Field Parameters:
pH =7.58 , Conductivity =0.527 µs/cm, T = 17.64 °C

B.O.W. 40'
B.O.B. 42'

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-02	SHEET 1 OF 1

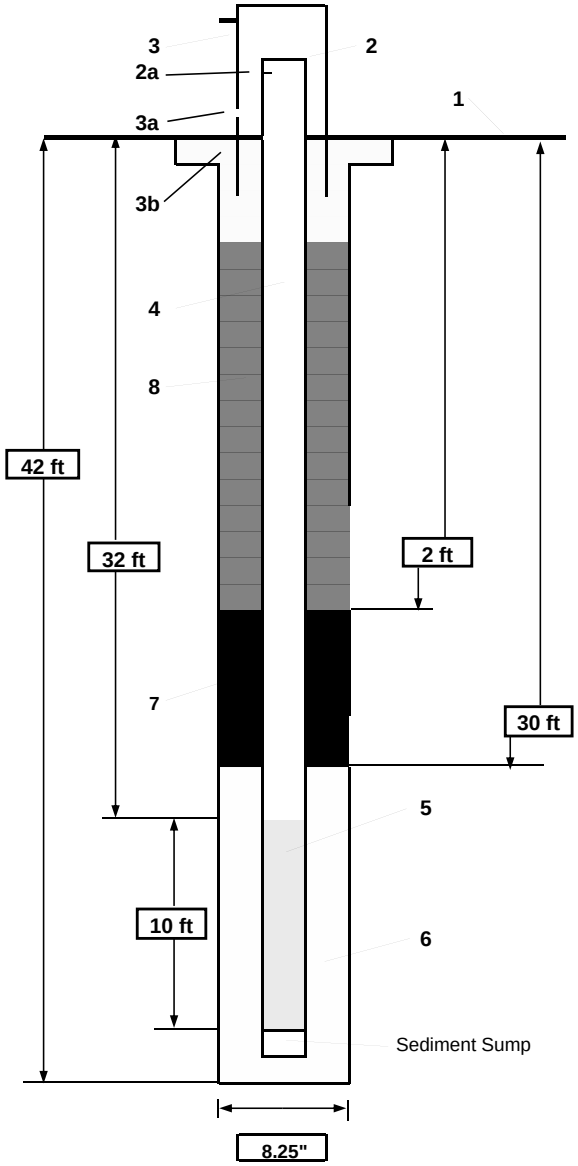
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 20.65 START : April 29h 2010 END: May 3rd, 2010 LOGGER : Kimberley Coke



1-	Ground elevation at well	29.59
2-	Top of casing elevation	Ground surface to 24 feet
	a) vent hole?	
3-	Wellhead protection cover type	4 Bollards
	a) weep hole?	
	b) concrete pad dimensions	3' x 3'
4-	Diameter/type of well casing	2" PVC
5-	Type/slot size of screen	Machine slotted 0.010 inch
6-	Type screen filter	DSI #1 sand
	a) Quantity used	7 bags
7-	Type of seal	3/8 bentonite plug
	a) Quantity used	3/4 - 1 bag
8-	Grout	
	a) Grout mix used	94 pound Portland Cement
	b) Method of placement	Bucket
	c) Vol. of well casing grout	NM
	Development method	
	Development time	
	Estimated purge volume	

Comments Total Well Depth (BTOC) = 42 ft.
Final Well Development Field Parameters:
pH = 8.75, Conductivity = 0.701 µs/cm, T = 18.17°C

B.O.W. 42'
B.O.B. 42'

NOTE: Diagram is not to scale.

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-03	SHEET 1 OF 1

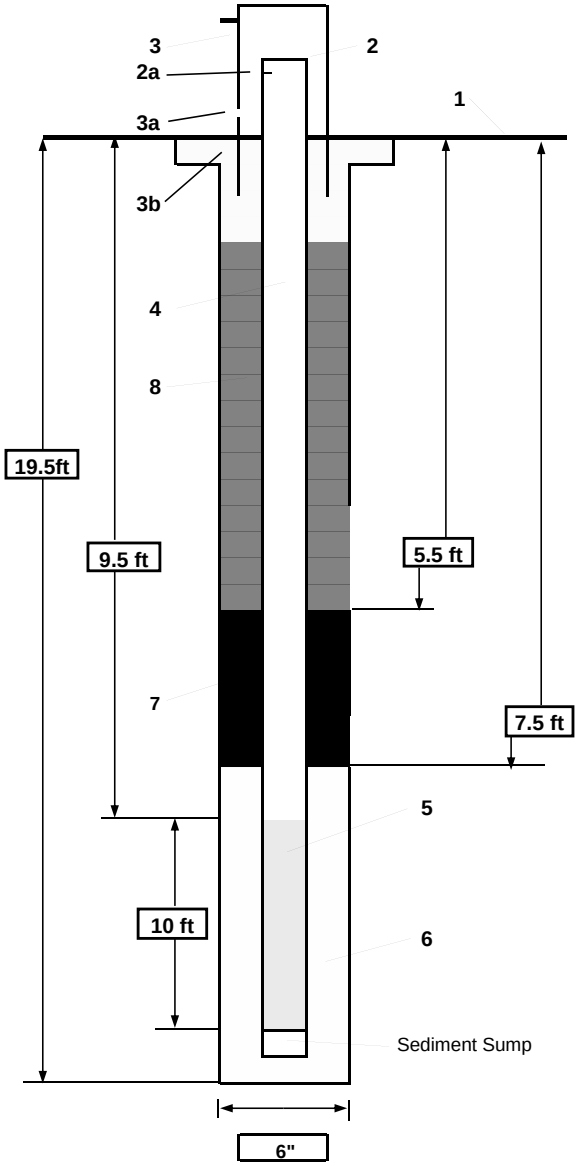
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 18.66 START : April 29th 2010 END: April 29th 2010 LOGGER : Kimberley Coke



NOTE: Diagram is not to scale.

1- Ground elevation at well: 28.82

2- Top of casing elevation: Ground surface to 22.5 feet
a) vent hole?

3- Wellhead protection cover type: 4 Bollards
a) weep hole?
b) concrete pad dimensions: 3' x 3'

4- Diameter/type of well casing: 2" PVC

5- Type/slot size of screen: Machine slotted
0.010 inch

6- Type screen filter: DSI #1 sand
a) Quantity used: 7 bags

7- Type of seal: 3/8 bentonite plug
a) Quantity used: 3/4 - 1 bag

8- Grout
a) Grout mix used: 94 pound Portland Cement
b) Method of placement: Bucket
c) Vol. of well casing grout: NM

Development method

Development time

Estimated purge volume

Comments: Total Well Depth (BTOC) = 19.5 ft.
Final Well Development Field Parameters:
pH = 7.19, Conductivity = 0.618 µs/cm, T = 14.78 °C

B.O.W. 20'
B.O.B. 24'

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-04	SHEET 1 OF 1

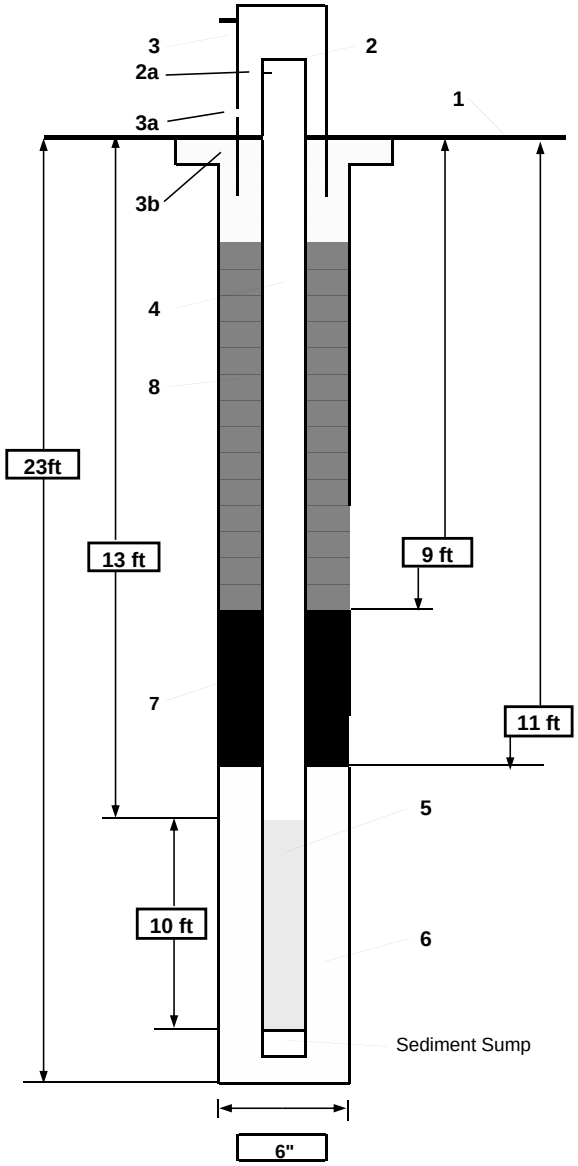
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 18.64 START : April 30th 2010 END: April 30th 2010 LOGGER : Kimberley Coke



NOTE: Diagram is not to scale.

1-	Ground elevation at well	29.13
2-	Top of casing elevation	Ground surface to 22.5 feet
	a) vent hole?	
3-	Wellhead protection cover type	4 Bollards
	a) weep hole?	
	b) concrete pad dimensions	3' x 3'
4-	Diameter/type of well casing	2" PVC
5-	Type/slot size of screen	Machine slotted 0.010 inch
6-	Type screen filter	DSI #1 sand
	a) Quantity used	7 bags
7-	Type of seal	3/8 bentonite plug
	a) Quantity used	3/4 - 1 bag
8-	Grout	
	a) Grout mix used	94 pound Portland Cement
	b) Method of placement	Bucket
	c) Vol. of well casing grout	NM
	Development method	
	Development time	
	Estimated purge volume	

Comments Total Well Depth (BTOC) = 23 ft.
Final Well Development Field Parameters:
pH = 7.19 , Conductivity = 0.641 µs/cm, T = 15.25 °C

B.O.W. 23'
B.O.B. 24'

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-05	SHEET 1 OF 1

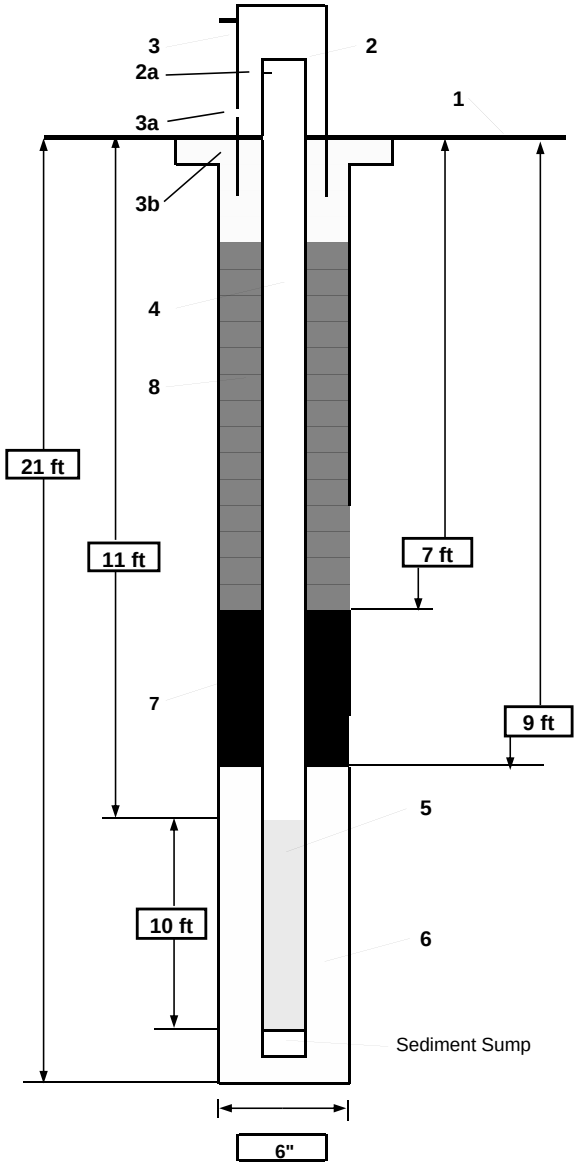
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 19.86 START : April 29th 2010 END: April 29th 2010 LOGGER : Kimberley Coke



NOTE: Diagram is not to scale.

1-	Ground elevation at well	30.11
2-	Top of casing elevation	Ground surface to 22.5 feet
	a) vent hole?	
3-	Wellhead protection cover type	4 Bollards
	a) weep hole?	
	b) concrete pad dimensions	3' x 3'
4-	Diameter/type of well casing	2" PVC
5-	Type/slot size of screen	Machine slotted 0.010 inch
6-	Type screen filter	DSI #1 sand
	a) Quantity used	7 bags
7-	Type of seal	3/8 bentonite plug
	a) Quantity used	3/4 - 1 bag
8-	Grout	
	a) Grout mix used	94 pound Portland Cement
	b) Method of placement	Bucket
	c) Vol. of well casing grout	NM
	Development method	
	Development time	
	Estimated purge volume	

Comments Total Well Depth (BTOC) = 21 ft.

Final Well Development Field Parameters:

pH = 7.43 , Conductivity = 0.500 µs/cm, T = 14.84°C

B.O.W. 21'

B.O.B. 23'

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-06	SHEET 1 OF 1

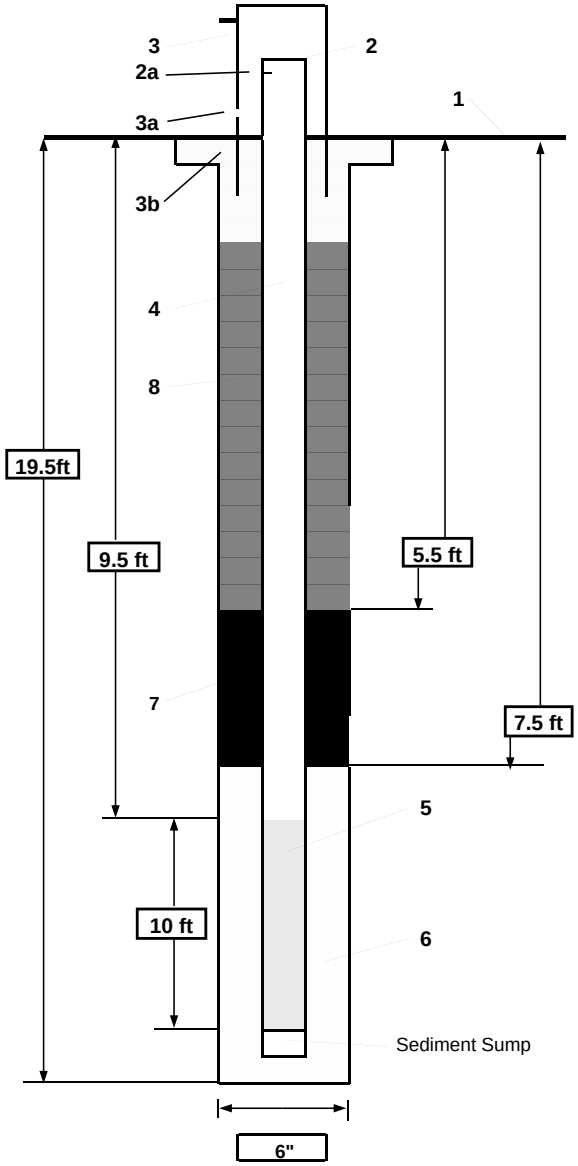
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 6" (Casing)

WATER LEVELS : 18.90 START : April 27th 2010 END: April 27th 2010 LOGGER : Kimberley Coke



NOTE: Diagram is not to scale.

1-	Ground elevation at well	29.15
2-	Top of casing elevation	Ground surface to 22.5 feet
	a) vent hole?	
3-	Wellhead protection cover type	4 Bollards
	a) weep hole?	
	b) concrete pad dimensions	3' x 3'
4-	Diameter/type of well casing	2" PVC
5-	Type/slot size of screen	Machine slotted 0.010 inch
6-	Type screen filter	DSI #1 sand
	a) Quantity used	7 bags
7-	Type of seal	3/8 bentonite plug
	a) Quantity used	3/4 - 1 bag
8-	Grout	
	a) Grout mix used	94 pound Portland Cement
	b) Method of placement	Bucket
	c) Vol. of well casing grout	NM
	Development method	
	Development time	
	Estimated purge volume	

Comments Total Well Depth (BTOC) = 19.5 ft.
Final Well Development Field Parameters:
pH = 7.19, Conductivity = 0.486 µs/cm, T = 14.62°C

B.O.W. 19.5'
B.O.B. 24'

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-07	SHEET 1 OF 1

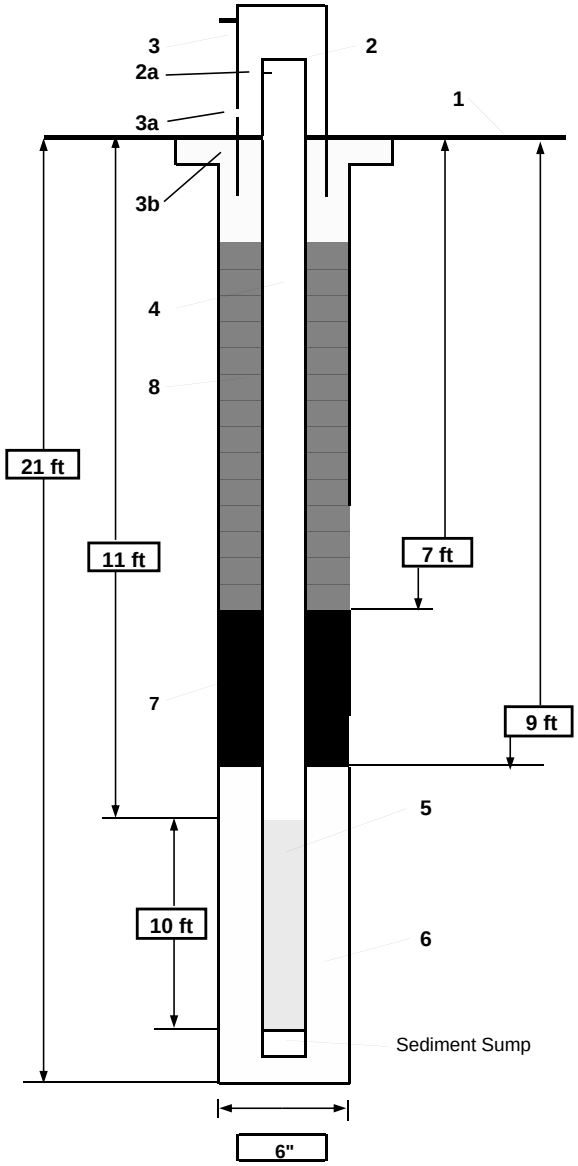
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 19.81 START : April 30th 2010 END: April 30th 2010 LOGGER : Kimberley Coke



NOTE: Diagram is not to scale.

1-	Ground elevation at well	29.25
2-	Top of casing elevation	Ground surface to 22.5 feet
	a) vent hole?	
3-	Wellhead protection cover type	4 Bollards
	a) weep hole?	
	b) concrete pad dimensions	3' x 3'
4-	Diameter/type of well casing	2" PVC
5-	Type/slot size of screen	Machine slotted 0.010 inch
6-	Type screen filter	DSI #1 sand
	a) Quantity used	7 bags
7-	Type of seal	3/8 bentonite plug
	a) Quantity used	3/4 - 1 bag
8-	Grout	
	a) Grout mix used	94 pound Portland Cement
	b) Method of placement	Bucket
	c) Vol. of well casing grout	NM
	Development method	
	Development time	
	Estimated purge volume	

Comments Total Well Depth (BTOC) = 21 ft.

Final Well Development Field Parameters:

pH = 7.12, Conductivity = 0.575 µs/cm, T = 13.74 °C

B.O.W. 21'

B.O.B. 20'

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-08	SHEET 1 OF 1

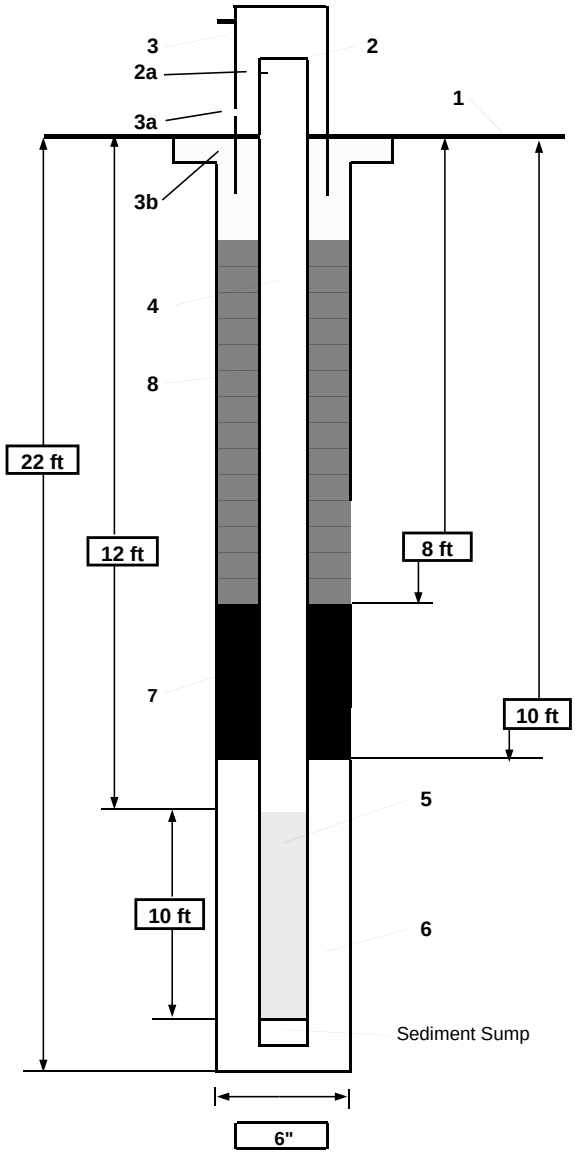
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 22.14 START : April 28th 2010 END: April 28th 2010 LOGGER : Kimberley Coke



1- Ground elevation at well: 29.89

2- Top of casing elevation: Ground surface to 22.5 feet
a) vent hole?

3- Wellhead protection cover type: 4 Bollards
a) weep hole?
b) concrete pad dimensions: 3' x 3'

4- Diameter/type of well casing: 2" PVC

5- Type/slot size of screen: Machine slotted
0.010 inch

6- Type screen filter: DSI #1 sand
a) Quantity used: 7 bags

7- Type of seal: 3/8 bentonite plug
a) Quantity used: 3/4 - 1 bag

8- Grout
a) Grout mix used: 94 pound Portland Cement
b) Method of placement: Bucket
c) Vol. of well casing grout: NM

Development method

Development time

Estimated purge volume

Comments: Total Well Depth (BTOC) = 22 ft.
Final Well Development Field Parameters:
pH = 7.3 , Conductivity = 0.513 μs/cm, T = 17.09 °C

B.O.W. 23'
B.O.B. 24'

NOTE: Diagram is not to scale.

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-09	SHEET 1 OF 1

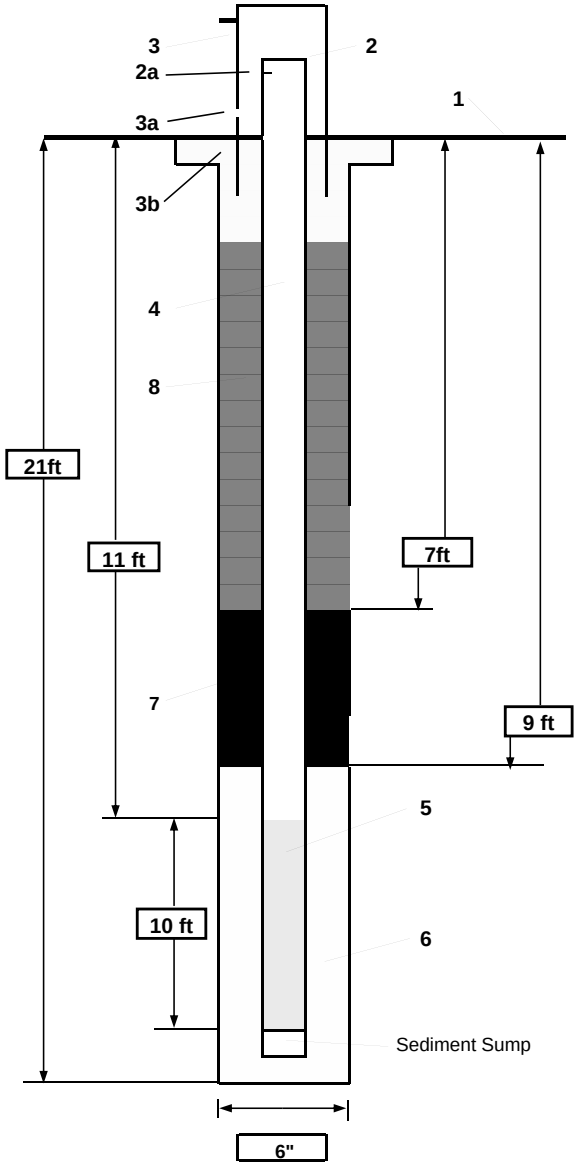
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 17.94 START : April 30th 2010 END: April 30th 2010 LOGGER : Kimberley Coke



NOTE: Diagram is not to scale.

1- Ground elevation at well	27.95
2- Top of casing elevation	Ground surface to 22.5 feet
a) vent hole?	
3- Wellhead protection cover type	4 Bollards
a) weep hole?	
b) concrete pad dimensions	3' x 3'
4- Diameter/type of well casing	2" PVC
5- Type/slot size of screen	Machine slotted 0.010 inch
6- Type screen filter	DSI #1 sand
a) Quantity used	7 bags
7- Type of seal	3/8 bentonite plug
a) Quantity used	3/4 - 1 bag
8- Grout	
a) Grout mix used	94 pound Portland Cement
b) Method of placement	Bucket
c) Vol. of well casing grout	NM
Development method	
Development time	
Estimated purge volume	

Comments Total Well Depth (BTOC) = 21 ft.
Final Well Development Field Parameters:
pH = 7.33, Conductivity = 0.524 µs/cm, T = 14.35 °C

B.O.W. 21'
B.O.B. 21'

PROJECT NUMBER	WELL NUMBER	
364428.FI.FS	MW-10	SHEET 1 OF 1

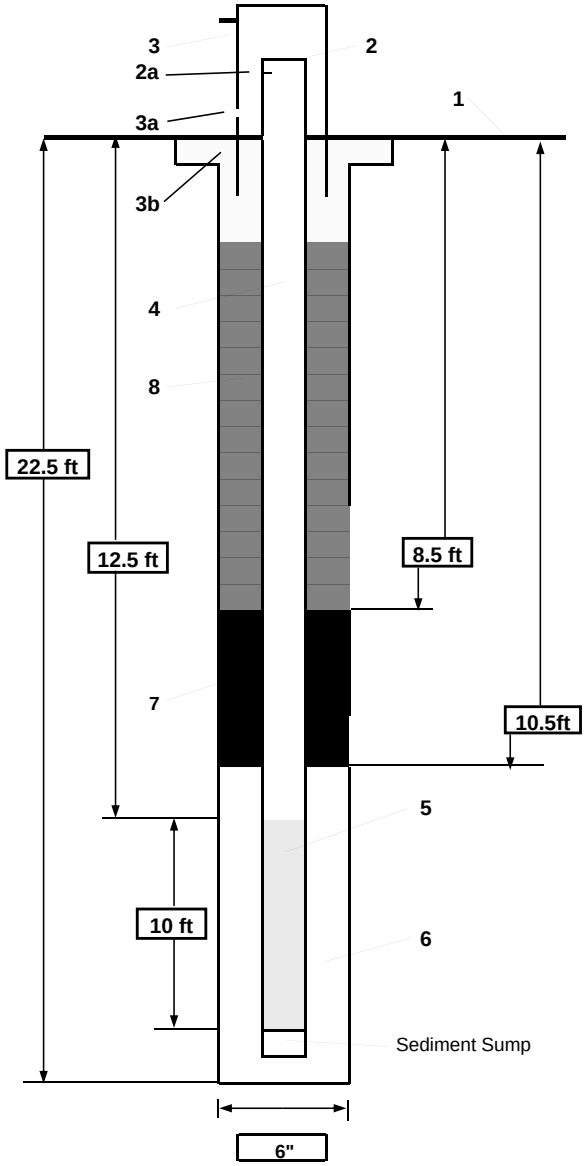
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 18.29 START : April 30th 2010 END: April 30th 2010 LOGGER : Kimberley Coke



NOTE: Diagram is not to scale.

1-	Ground elevation at well	NM
2-	Top of casing elevation	Ground surface to 22.5 feet
	a) vent hole?	
3-	Wellhead protection cover type	4 Bollards
	a) weep hole?	
	b) concrete pad dimensions	3' x 3'
4-	Diameter/type of well casing	2" PVC
5-	Type/slot size of screen	Machine slotted 0.010 inch
6-	Type screen filter	DSI #1 sand
	a) Quantity used	7 bags
7-	Type of seal	3/8 bentonite plug
	a) Quantity used	3/4 - 1 bag
8-	Grout	
	a) Grout mix used	94 pound Portland Cement
	b) Method of placement	Bucket
	c) Vol. of well casing grout	NM
	Development method	
	Development time	
	Estimated purge volume	

Comments Total Well Depth (BTOC) = 22.5 ft.
Final Well Development Field Parameters:
pH = 7.59, Conductivity = 0.391 µs/cm, T = 13.77°C

B.O.W. 22.5'
B.O.B. 24'

PROJECT NUMBER	WELL NUMBER	
395816.FI.FS	MW-11	SHEET 1 OF 1

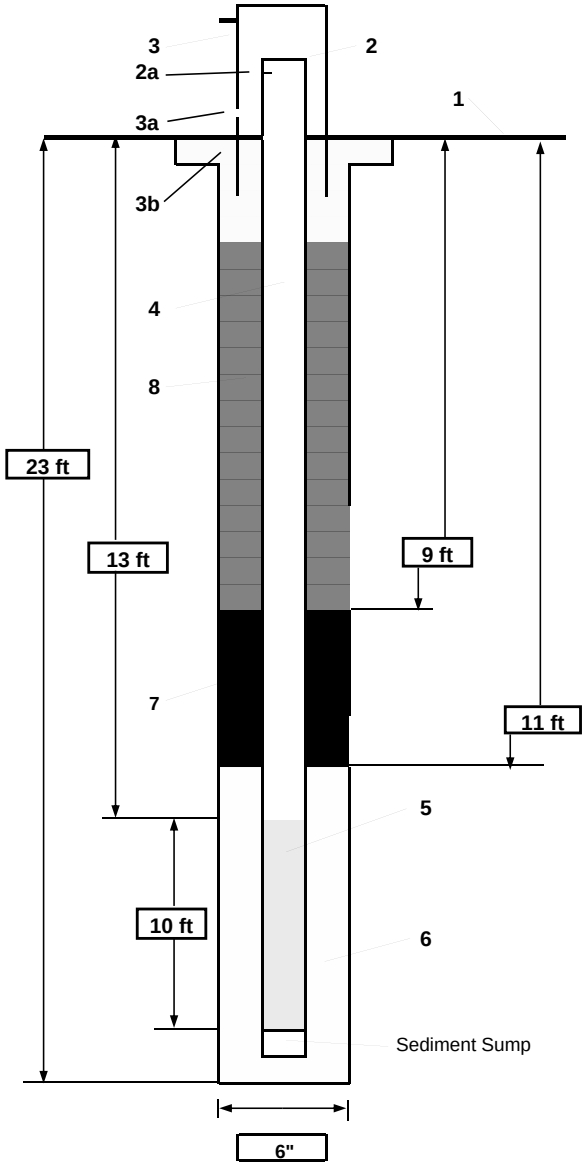
WELL COMPLETION DIAGRAM

PROJECT : NWS Yorktown LOCATION : Site 24

DRILLING CONTRACTOR : Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger 8/25" (Casing)

WATER LEVELS : 17.31 START : May 30th 2013 END: May 30th 2013 LOGGER : Brian Wachter



1- Ground elevation at well: NM

2- Top of casing elevation: Ground surface to 23 feet
a) vent hole?

3- Wellhead protection cover type: 4 Bollards
a) weep hole?
b) concrete pad dimensions: 3' x 3'

4- Diameter/type of well casing: 2" PVC

5- Type/slot size of screen: Machine slotted
0.010 inch

6- Type screen filter: DSI #1 sand
a) Quantity used: 7 bags

7- Type of seal: 3/8 bentonite plug
a) Quantity used: 3/4 - 1 bag

8- Grout
a) Grout mix used: 94 pound Portland Cement
b) Method of placement: Bucket
c) Vol. of well casing grout: NM

Development method

Development time

Estimated purge volume

Comments: Total Well Depth (BTOC) = 23 ft.
Final Well Development Field Parameters:
pH = 7.07, Conductivity = 0.553 µs/cm, T = 16.53°C

B.O.W. 23'
B.O.B. 24'

NOTE: Diagram is not to scale.

Appendix E
Soil Boring Logs

CH2MHILL	PROJECT NUMBER 395816	BORING NUMBER GW-11

SOIL BORING LOG

PROJECT : Site 24 LOCATION : NWS Yorktown

ELEVATION : NM DRILLING CONTRACTOR Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Split spoon and 4 1/4" HSA, Truck Mounted CME rig

ATD WATER LEVEL : Start: 5/29/2013 END : 5/29/2013 LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N')	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.)	USCS	COMMENTS (DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. DRILLING ACTIONS/DRILLER COMMENTS) PID Readings: Breathing Zone:	Above Hole:
	0-4	48	MC1	NA	**0-2':** sandy CLAY (CL), brownish yellow (10 YR 6/8), moist, medium stiff, clay and sand		0	0
							0	0
							0	0
							0	0
5	4-8	48	MC2	NA	**2-8':** silty CLAY (CL), very pale brown (10 YR 7/4), moist, medium stiff, clay with little silt		0	0
							0	0
							0	0
							0	0
							0.3	0
10	8-12	48	MC3	NA	**8-12':** silty CLAY (CL), brownish yellow (10 YR 6/6), moist, stiff, silt and clay	CL	0.3	0
							0.1	0
							0	0
	12-16	24	MC4	NA	**12-12.5':** silty CLAY (CL), yellowish brown (10 YR **12.5-14':** sandy CLAY (CL), yellowish brown (10 YR 5/6), very moist, soft to medium stiff, clay with some sand and some shell hash		0	0
							0	0
15					**14-16':** no recovery			
	16-20	48	MC5	NA	**16-16.5':** silty CLAY (CL), yellowish brown (10 YR		0	0
					16.5-20': sandy shelly CLAY (CL), very pale brown (10 YR 7/4), wet, soft, clay and shells and sand		0	0
							0	0
20							0	0
	20-24	48	MC6	NA	**20-21.5':** shelly clayey SAND (SC), bluish gray (Gley 2 5/1 10B), wet, loose, sand and clay and shell hash	SC	0	0
					21.5-22': shelly sandy CLAY (CL), bluish gray (Gley 2	CL	0	0
					22-23': shelly clayey sand (SC), bluish gray (Gley 2 5/1 10B), wet, medium dense, sand and clay and shell	SC	0	0
					23-24.5': sandy shelly clay (CL), bluish gray (Gley 2 5/1 10B), moist, medium stiff, clay and shell hash with trace sand	CL	0	0
25	24-28	48	MC7	NA			0	0
					24.5-27': clayey shelly sand (SC), dark bluish gray (Gley 2 4/1 10B), wet, loose, sand and shell hash with some clay	SC	0	0
							0	0
					27-28': shelly silty sand (SM), dark bluish gray (Gley 2 4/1 10B), wet, medium dense, sand and silt with trace		0	0
	28-32	48	MC8	NA	**28-31':** clayey shelly silty sand (SM), bluish gray (Gley 2 5/1 10B), wet, loose, sand and silt with little shell hash and trace clay	SM	0	0
30							0	0

CH2MHILL	PROJECT NUMBER 395816	BORING NUMBER GW-11

SOIL BORING LOG

PROJECT : Site 24 LOCATION : NWS Yorktown

ELEVATION : NM DRILLING CONTRACTOR Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED : Split spoon and 4 1/4" HSA, Truck Mounted CME rig

ATD WATER LEVEL : Start: 5/29/2013 END : 5/29/2013 LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N')	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	USCS	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. DRILLING ACTIONS/DRILLER COMMENTS; PID Readings: Breathing Zone: Above Hole:
	28-32	48	MC8	NA	**31-32':** shelly silty sand (SM), bluish gray (Gley 2 5/1 10B), wet, medium dense, sand with trace silt and	SM	0 0 0 0
35							
40							
45							
50							
55							
60							

Appendix F
Survey Report

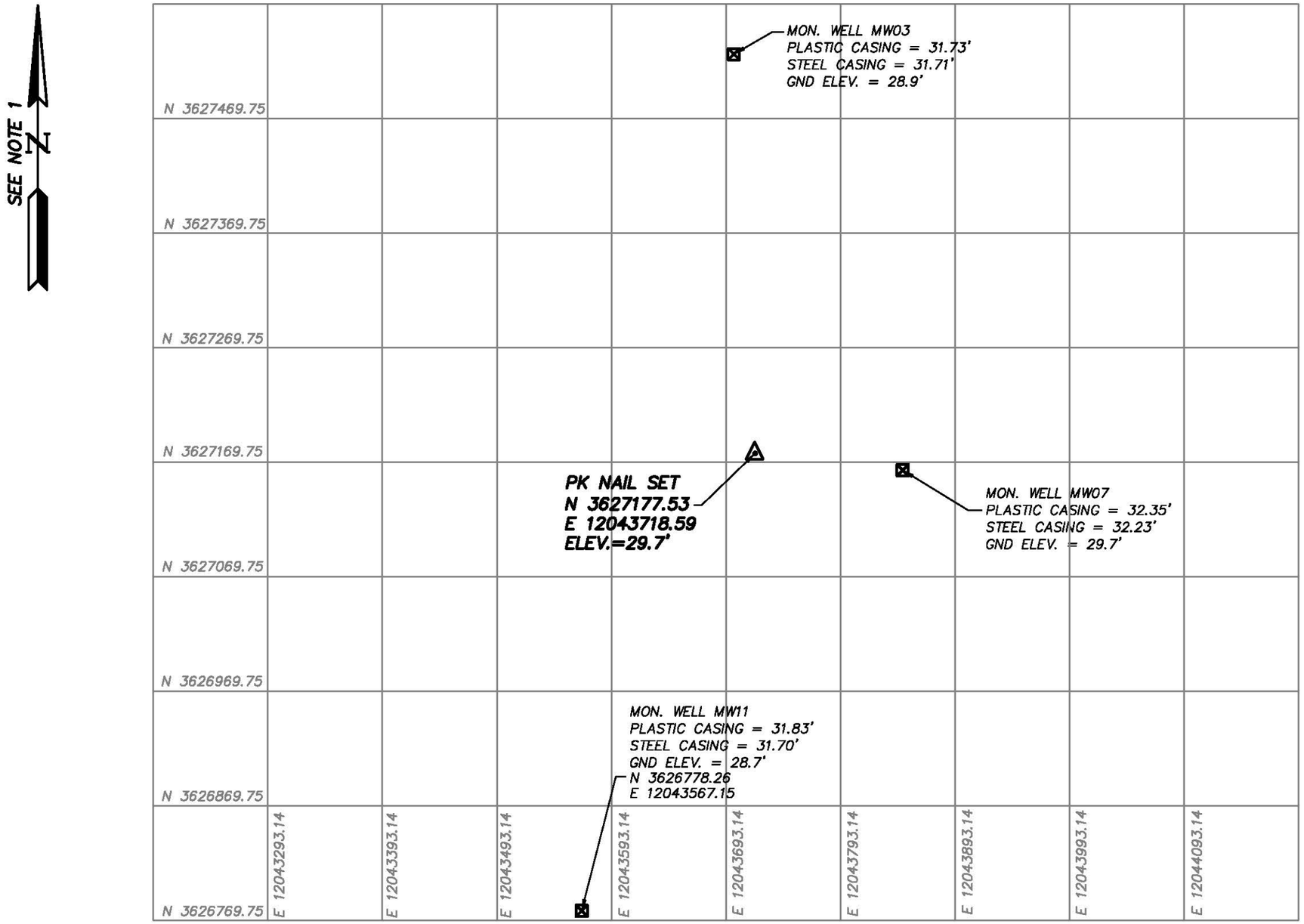
LOCATION OF NEW

MONITORING WELLS

AT SITE 24
NAVAL WEAPONS STATION YORKTOWN
FOR: CH2MHILL
PROJ. #13-083
SCALE: 1"=100' – DATE: 7/2/13

MICHAEL SURVEYING
& MAPPING, P.C.
41 OLD OYSTER POINT ROAD
SUITE B
NEWPORT NEWS, VA. 23602
TEL 757.873.1762
FAX 757.873.1772

COMMONWEALTH OF VIRGINIA
7/2/13
PAUL W. MICHAEL, JR.
Lic NO. 002438
LAND SURVEYOR



LEGEND

△ DENOTES TRAVERSE CONTROL POINT

⊠ DENOTES MON. WELL

NOTES:

1. HORIZONTAL COORDINATES ARE REFERRED TO VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE NAD 83. ELEVATIONS REFER TO NAVD 88 DATUM. UNITS ARE IN U.S. SURVEY FEET.

2. THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF, PAUL W. MICHAEL, JR. FROM AND ACTUAL [X] GROUND OR AIRBORNE SURVEY MADE UNDER MY SUPERVISION; THAT THE IMAGERY AND/OR ORIGINAL DATA WAS OBTAINED IN JULY 2, 2013 ; AND THAT THIS PLAT, MAP, OR DIGITAL GEOSPATIAL DATA INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

CH2MHILL - WELL SITE 24 - NAVAL WEPON STATION YORKTOWN

PROJ. #13-083 - DATE: JULY 2, 2013

POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
10	3626778.26	12043567.15	28.68	MON WELL 11 GROUND
22	3626778.26	12043567.15	31.70	MON WELL 11 METAL CASING
23	3626778.26	12043567.15	31.83	MON WELL 11 PLASTIC CASING
2012	3627177.53	12043718.59	29.74	PK NAIL SET

Appendix G
IDW Analytical Data

CLEAN 1000 CTO-WE19
Yorktown Site 12 and 24
IDW Analytical Results
June 2013

Sample ID	YS12-IDWAQ-060513	YS12-IDWSO-060513
Sample Date	6/5/13	6/5/13
Chemical Name		
TCLP Volatile Organic Compounds (MG/L)		
1,1-Dichloroethene	0.05 U	0.05 U
1,2-Dichloroethane	0.05 U	0.05 U
2-Butanone	0.2 U	0.2 U
Benzene	0.1 U	0.1 U
Carbon tetrachloride	0.1 U	0.1 U
Chlorobenzene	0.05 U	0.05 U
Chloroform	0.1 U	0.1 U
Tetrachloroethene	0.05 U	0.05 U
Trichloroethene	0.1 U	0.1 U
Vinyl chloride	0.05 U	0.05 U
TCLP Semivolatile Organic Compounds (MG/L)		
1,4-Dichlorobenzene	0.0005 U	0.0005 U
2,4,5-Trichlorophenol	0.0025 U	0.0025 U
2,4,6-Trichlorophenol	0.0025 U	0.0025 U
2,4-Dinitrotoluene	0.001 U	0.001 U
2-Methylphenol	0.002 U	0.002 U
3- and 4-Methylphenol	0.002 U	0.002 U
Hexachlorobenzene	0.001 U	0.001 U
Hexachlorobutadiene	0.001 U	0.001 U
Hexachloroethane	0.001 U	0.001 U
Nitrobenzene	0.002 U	0.002 U
Pentachlorophenol	0.005 U	0.005 U
Pyridine	0.01 U	0.01 U
TCLP Pesticides/Polychlorinated Biphenyls (MG/L)		
Endrin	0.005 U	0.005 U
gamma-BHC (Lindane)	0.005 U	0.005 U
Heptachlor	0.005 U	0.005 U
Heptachlor epoxide	0.005 U	0.005 U
Methoxychlor	0.001 U	0.001 U
technical-Chlordane	0.025 U	0.025 U
Toxaphene	0.062 U	0.062 U
TCLP Herbicides (MG/L)		
2,4,5-TP (Silvex)	0.062 U	0.062 U
2,4-D	0.062 U	0.062 U
TCLP Metals (MG/L)		
Arsenic	0.041 J	0.1 U
Barium	0.11 J	0.43
Cadmium	0.01 U	0.0045 J
Chromium	0.02 U	0.02 U
Lead	0.05 U	0.05 U
Mercury	0.0001 U	0.0001 U
Selenium	0.1 U	0.1 U
Silver	0.01 U	0.01 U
Wet Chemistry (MG/KG)		
Cyanide	0.05 U	0.05 U
Reactivity (MG/KG)		

CLEAN 1000 CTO-WE19
Yorktown Site 12 and 24
IDW Analytical Results
June 2013

Sample ID	YS12-IDWAQ-060513	YS12-IDWSO-060513
Sample Date	6/5/13	6/5/13
Chemical Name		
Reactive sulfide	10 U	10 U
Corrosivity (PH)		
pH	7.3	7.7
Ignitability (DEG/F)		
Flash point	200 >	200 >

Notes:

> - Sample did not ignite, flashpoint is greater than the value shown
DEG/F - Degrees Fahrenheit

J - Analyte present. Value may or may not be accurate or precise
MG/KG - Milligrams per kilogram
MG/L - Milligrams per liter
NS - Not sampled
PH - pH units
U - The material was analyzed for, but not detected

CLEAN 1000 CTO-WE19
Yorktown Site 12 and 24
IDW Analytical Results
June 2013

Sample ID	YS12-IDWAQ-060513	YS12-IDWSO-060513
Sample Date	6/5/13	6/5/13
Chemical Name		
TCLP Volatile Organic Compounds (MG/L)		
No Detections		
TCLP Semivolatile Organic Compounds (MG/L)		
No Detections		
TCLP Pesticides/Polychlorinated Biphenyls (MG/L)		
No Detections		
TCLP Herbicides (MG/L)		
No Detections		
TCLP Metals (MG/L)		
Arsenic	0.041 J	0.1 U
Barium	0.11 J	0.43
Cadmium	0.01 U	0.0045 J
Chromium	0.02 U	0.02 U
Selenium	0.1 U	0.1 U
Wet Chemistry (MG/KG)		
No Detections		
Reactivity (MG/KG)		
No Detections		
Corrosivity (PH)		
pH	7.3	7.7
Ignitability (DEG/F)		
No Detections		

Notes:

> - Sample did not ignite, flashpoint is greater than the value shown
DEG/F - Degrees Fahrenheit

J - Analyte present. Value may or may not be accurate or precise
MG/KG - Milligrams per kilogram
MG/L - Milligrams per liter
NS - Not sampled
PH - pH units
U - The material was analyzed for, but not detected
Shading indicates detection

Appendix H
IDW Profiles and Disposal Manifests

Clearfield MMG
Post Office Box 1444
Chesapeake, VA 23327
(757) 549-8448
FAX: (757) 549-6668

NON-HAZARDOUS SHIPPING MANIFEST

MANIFEST NO._____

GENERATOR

NAME **NAVFAC Mid-Atlantic** TELEPHONE **757-341-0477**

ADDRESS **9742 Maryland Ave. Bldg N-26** CITY **Yorktown** STATE **VA**

SHIPMENT ORIGIN **WPNSTA Yorktown, Site 1** CITY **Yorktown** STATE **VA**

AUTHORIZED AGENT **c/o CH2M Hill, Inc.** FIRM

ADDRESS OTHER **CTO WE35**
CH2M HILL Project # 429391

MATERIAL CHARACTERIZATION

ACTIVITY GENERATING THIS MATERIAL: UST/AST REMOVAL _____ OTHER **IDW**

PETROLEUM TYPE (S): **None** VIRGIN PRODUCT_____ NON-VIRGIN PRODUCT_____

PHYSICAL STATE: STOCKPILED _____ EXCAVATING_____ DRUMS **22** ***(22 Aqueous)*** OTHER _____

HANDLING INSTRUCTIONS: **Transport To Facility Designated Below**

FIRE OR SPILL INSTRCUTIONS: **Non-Flammable / Non-Hazardous**

DESTINATION: **Chesapeake Facility, 416 Dominion Blvd. North**

I hereby certify, to the best of my knowledge, the material characterized above is non-hazardous as defined by the Virginia Hazardous Waste Management Regulations, Federal Regulations under Subtitle C - RCRA, U.S. Department of Transportation, or local / state of origin regulations.

_____
Signature of Generator / Agent

_____
Printed Name / Date

TRANSPORTER

TRANSPORTER NAME **Clearfield MMG, Inc.** TELEPHONE **757-549-8448** TRUCK NO. **14**

I certify that the materials described above were received by me for shipment and delivered to the designated facility.

_____
Transporter Signature / Date

FACILTIY

I certify that the materials described above were delivered to the facility and received by me.

ACCEPTED BY_____ DATE _____

REASONS FOR REJECTION _____

Gross Weight	
Tare Weight	
Net Weight	
Tons	

FACILITY

Clearfield MMG
Post Office Box 1444
Chesapeake, VA 23327
(757) 549-8448
FAX: (757) 549-6668

NON-HAZARDOUS SHIPPING MANIFEST

MANIFEST NO._____

GENERATOR

NAME **NAVFAC Mid-Atlantic** TELEPHONE **757-341-0477**

ADDRESS **9742 Maryland Ave. Bldg N-26** CITY **Yorktown** STATE **VA**

SHIPMENT ORIGIN **WPNSTA Yorktown, Site 12** CITY **Yorktown** STATE **VA**

AUTHORIZED AGENT **c/o CH2M Hill, Inc.** FIRM

ADDRESS OTHER **CTO WE73**
CH2M HILL Project # 465289

MATERIAL CHARACTERIZATION

ACTIVITY GENERATING THIS MATERIAL: UST/AST REMOVAL _____ OTHER **IDW**

PETROLEUM TYPE (S): **None** VIRGIN PRODUCT_____ NON-VIRGIN PRODUCT_____

PHYSICAL STATE: STOCKPILED _____ EXCAVATING_____ DRUMS **2** OTHER _____
(1 Aqueous, 1 Soil)

HANDLING INSTRUCTIONS: **Transport To Facility Designated Below**

FIRE OR SPILL INSTRCUTIONS: **Non-Flammable / Non-Hazardous**

DESTINATION: **Chesapeake Facility, 416 Dominion Blvd. North**

I hereby certify, to the best of my knowledge, the material characterized above is non-hazardous as defined by the Virginia Hazardous Waste Management Regulations, Federal Regulations under Subtitle C - RCRA, U.S. Department of Transportation, or local / state of origin regulations.

_____
Signature of Generator / Agent

_____
Printed Name / Date

TRANSPORTER

TRANSPORTER NAME **Clearfield MMG, Inc.** TELEPHONE **757-549-8448** TRUCK NO. **14**

I certify that the materials described above were received by me for shipment and delivered to the designated facility.

_____
Transporter Signature / Date

FACILTIY

I certify that the materials described above were delivered to the facility and received by me.

ACCEPTED BY_____ DATE _____

REASONS FOR REJECTION _____

Gross Weight	
Tare Weight	
Net Weight	
Tons	

FACILITY

Clearfield MMG
Post Office Box 1444
Chesapeake, VA 23327
(757) 549-8448
FAX: (757) 549-6668

NON-HAZARDOUS SHIPPING MANIFEST

MANIFEST NO._____

GENERATOR

NAME **NAVFAC Mid-Atlantic** TELEPHONE **757-341-0477**

ADDRESS **9742 Maryland Ave. Bldg N-26** CITY **Yorktown** STATE **VA**

SHIPMENT ORIGIN **WPNSTA Yorktown, Site 24** CITY **Yorktown** STATE **VA**

AUTHORIZED AGENT **c/o CH2M Hill, Inc.** FIRM

ADDRESS OTHER **CTO WE19**
CH2M HILL Project # 395816

MATERIAL CHARACTERIZATION

ACTIVITY GENERATING THIS MATERIAL: UST/AST REMOVAL _____ OTHER **IDW**

PETROLEUM TYPE (S): **None** VIRGIN PRODUCT_____ NON-VIRGIN PRODUCT_____

PHYSICAL STATE: STOCKPILED _____ EXCAVATING_____ DRUMS **3** OTHER _____
(1 Aqueous, 2 Soil)

HANDLING INSTRUCTIONS: **Transport To Facility Designated Below**

FIRE OR SPILL INSTRCUTIONS: **Non-Flammable / Non-Hazardous**

DESTINATION: **Chesapeake Facility, 416 Dominion Blvd. North**

I hereby certify, to the best of my knowledge, the material characterized above is non-hazardous as defined by the Virginia Hazardous Waste Management Regulations, Federal Regulations under Subtitle C - RCRA, U.S. Department of Transportation, or local / state of origin regulations.

_____
Signature of Generator / Agent

_____
Printed Name / Date

TRANSPORTER

TRANSPORTER NAME **Clearfield MMG, Inc.** TELEPHONE **757-549-8448** TRUCK NO. **14**

I certify that the materials described above were received by me for shipment and delivered to the designated facility.

_____
Transporter Signature / Date

FACILTIY

I certify that the materials described above were delivered to the facility and received by me.

ACCEPTED BY_____ DATE _____

REASONS FOR REJECTION _____

Gross Weight	
Tare Weight	
Net Weight	
Tons	

FACILITY

Soilex Corporation
Post Office Box 1444
Chesapeake, VA 23327
(757) 549-8448
FAX: (757) 549-6668

NON-HAZARDOUS SHIPPING MANIFEST

MANIFEST NO. 1

GENERATOR

NAME	NAVFAC Mid-Atlantic	TELEPHONE 757-341-0479	
ADDRESS	9742 Maryland Ave. Bldg. N-26	CITY Norfolk	STATE VA
SHIPMENT ORIGIN	NWS Yorktown, Site 24	CITY Yorktown	STATE VA
AUTHORIZED AGENT		FIRM	
ADDRESS	c/o Potomac Environmental	OTHER	

MATERIAL CHARACTERIZATION

ACTIVITY GENERATING THIS MATERIAL: UST/AST REMOVAL _____ OTHER IDW

PETROLEUM TYPE (S): No Petroleum VIRGIN PRODUCT _____ NON-VIRGIN PRODUCT _____

PHYSICAL STATE: STOCKPILED _____ EXCAVATING _____ DRUMS 23 OTHER _____

HANDLING INSTRUCTIONS: **Transport To Facility Designated Below**

FIRE OR SPILL INSTRCUTIONS: **Non-Flammable / Non-Hazardous**

DESTINATION: Chesapeake Facility

I hereby certify, to the best of my knowledge, the material characterized above is non-hazardous as defined by the Virginia Hazardous Waste Management Regulations, Federal Regulations under Subtitle C - RCRA, U.S. Department of Transportation, or local / state of origin regulations.

Signature of Generator / Agent

THOMAS KAWALSKI / 7/27/2010
Printed Name / Date

TRANSPORTER

TRANSPORTER NAME Soilex Corporation TELEPHONE 549-8448 TRUCK NO. BOX

I certify that the materials described above were received by me for shipment and delivered to the designated facility.

Phillips 7-27-10
Transporter Signature / Date

FACILTIY

I certify that the materials described above were delivered to the facility and received by me.

ACCEPTED BY _____ DATE 7/27/10

REASONS FOR REJECTION _____

Gross Weight	
Tare Weight	
Net Weight	
Tons	

FACILITY

Soilex Corporation
Post Office Box 1444
Chesapeake, VA 23327
(757) 549-8448
FAX: (757) 549-6668

NON-HAZARDOUS SHIPPING MANIFEST

MANIFEST NO. 2

GENERATOR

NAME	NAVFAC Mid-Atlantic	TELEPHONE 757-341-0479	
ADDRESS	9742 Maryland Ave. Bldg. N-26	CITY Norfolk	STATE VA
SHIPMENT ORIGIN	NWS Yorktown, Site 24	CITY Yorktown	STATE VA
AUTHORIZED AGENT		FIRM	
ADDRESS	c/o Potomac Environmental	OTHER	

MATERIAL CHARACTERIZATION

ACTIVITY GENERATING THIS MATERIAL: UST/AST REMOVAL _____ OTHER IDW

PETROLEUM TYPE (S): No Petroleum VIRGIN PRODUCT _____ NON-VIRGIN PRODUCT _____

PHYSICAL STATE: STOCKPILED _____ EXCAVATING _____ DRUMS 22 OTHER _____

HANDLING INSTRUCTIONS: **Transport To Facility Designated Below**

FIRE OR SPILL INSTRCUTIONS: **Non-Flammable / Non-Hazardous**

DESTINATION: Chesapeake Facility

I hereby certify, to the best of my knowledge, the material characterized above is non-hazardous as defined by the Virginia Hazardous Waste Management Regulations, Federal Regulations under Subtitle C - RCRA, U.S. Department of Transportation, or local / state of origin regulations.

Signature of Generator / Agent

THOMAS KOWALSKI / 7/27/10
Printed Name / Date

TRANSPORTER

TRANSPORTER NAME Soilex Corporation TELEPHONE 549-8448 TRUCK NO. 80X

I certify that the materials described above were received by me for shipment and delivered to the designated facility.

7-27-10
Transporter Signature / Date

FACILTIY

I certify that the materials described above were delivered to the facility and received by me.

ACCEPTED BY _____ DATE 7/27/10

REASONS FOR REJECTION _____

Gross Weight	
Tare Weight	
Net Weight	
Tons	

FACILITY

Appendix I
Data Quality Evaluation

Data Quality Evaluation

1 Data Quality Assessment

This data quality evaluation assesses the effect of the overall analytical process on the "availability" of the analytical data. "Availability" in this context refers to whether results can be used by the project team based on their analytical soundness. If a result is analytically sound, it is available for use for evaluating the potential releases, nature and extent of contamination, and estimating potentially associated human health and ecological risks. However, a particular result or group of results may not be "usable" for these purposes if other conditions apply. In order to avoid confusion of terms, this data quality evaluation differentiates the "availability" of results from "usability" of results. "Available" results are analytically sound and available for use by the project team to make decisions, even if they are not usable for a particular purpose.

The three major categories of data evaluation are laboratory performance, field collection performance (i.e. blank contamination and field duplicate reproducibility), and matrix interference. Evaluation of laboratory performance is a check for the laboratory's compliance with the method requirements. Additionally, an independent, third-party validator conducts a review of the laboratory data to assess whether the analytical methods were within required control limits. Evaluation of field collection performance, such as blank contamination and field duplicates, involves the review of field quality control (QC) samples and the determination of their effect on the sample results. Evaluation of potential matrix interferences involved the review of several areas of results, including surrogate spike recoveries and duplicate sample results.

The data evaluation and validation is a multi-tiered approach. The process begins with an internal laboratory review, continues with an independent review by a third-party validator, and ends with an overall review by the CH2M HILL project chemistry team. While only the data validator is allowed to apply qualifiers to the data, the process provides a medium for essential communication between the laboratory, validator, and project team, and allows for data quality to be thoroughly evaluated.

1.1 Laboratory Internal Quality Control Review

Prior to releasing the analytical data, the laboratory reviewed both the sample and QC data to verify sample identity, instrument calibration, quantitation limits, dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. To define a laboratory QC exceedance and the appropriate corrective action, the laboratory referred to its in-house SOPs and the limits agreed to in the NWS Yorktown *Site 24 Sampling and Analysis Plan* (CH2M HILL, 2010). The SOPs were based on Department of Defense requirements, the analytical method, and accumulated laboratory experience. If a laboratory QC exceedance occurred, the situation was reviewed by the appropriate personnel to determine whether it was acceptable or it would require corrective action by the laboratory.

In addition, the QC data were tabulated and the results reviewed to determine whether they were within the contract-required limits for accuracy and precision. Any non-conforming data was discussed in the data package cover letter and case narrative.

1.2 Data Validation

An internal data validator reviewed all data packages using the validation criteria outlined in the UFP-SAP and Addendum (CH2M HILL, 2010). Analytical methods and laboratory standard operating procedures (SOPs) presented in the sampling and analysis plan (SAP) were used to evaluate compliance against quality assurance (QA)/QC criteria. If QA/QC criteria were not met, data was considered for qualification. The data qualifiers were those presented in *Region III Modifications to the National Functional Guidelines for Organic Data Review (September 1994)* and *Region III Modifications to National Functional Guidelines for Inorganic Data Review (April 1993)*. These guidelines were not used for data validation; however, the specific qualifiers listed therein may have been applied to data had non-conformances against the QA/QC criteria been identified.

The data validation process was focused on the effects of the laboratory's performance and the sample matrices' effects on the analytical results. Areas of review consisted of holding time compliance, surrogate recovery accuracy, blank contamination (field, trip, equipment, and method blanks), initial and continuing calibration accuracy and precision, laboratory control sample (LCS) accuracy, internal standard response and retention time accuracy, instrument tune criteria accuracy, matrix spike and matrix spike duplicate (MS/MSD) recovery and duplicate sample precision (laboratory and field duplicates). Additionally, the analytical spectrum and raw data output were reviewed and 10% of the laboratory results were recalculated from the raw data to verify final laboratory identification and quantitation.

When multiple analyses were performed, the analytical run with the lowest quantitation limits was selected by the validator if the QC criteria were met for that analysis. If a sample was analyzed more than once as a result of concentrations exceeding the calibration range, the data validator selected results from the appropriate dilution.

1.3 General Data Qualifiers and Usability

In general, the data validator examines each data point and determines any effects that QC exceedances may have had.

The J-qualification, UJ-qualification, and U-qualification of results are common occurrences and have no adverse effect on the availability of that result to the project team for making decisions. J-qualified results are available, at the reported result, for use as detects as long as they are considered "estimated" by the project team. Human health risk assessment guidance suggests that these qualifiers "indicate uncertainty in the reported concentration of the chemical, but not in its assigned identity. Therefore, these data can be used just as positive data with no qualifiers or codes." In addition, one should use "J-qualified concentrations the same way as positive data that do not have this qualifier" (Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual. (Part A) EPA/540/1-89/002. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. 1989). U-qualified and UJ-qualified results are available, at the reported quantitation limit, for use as non-detects as long as they are considered "non-detect," "not detected at a significantly greater concentration than that in an associated blank" or "non-detect, estimated quantitation limit," as appropriate.

The B-qualification indicates that the results may be attributable to field or laboratory blank contamination, and that the analyte was detected in the associated blank as well as in the sample. B-qualified results are usable as non-detects as long as they are considered "not detected at significantly greater concentration than that in an associated blank."

The K-qualification, L-qualification, and UL-qualification indicate the data is affected by an undeterminable degree of positive or negative bias. This may indicate the presence of a QC problem, but not a problem severe enough to warrant rejection of data. K-qualified results are usable as detects as long as they are considered "estimated and biased high." L-qualified results are available for use as detects and UL-qualified results are usable as non-detects as long as L- and UL-qualified results are considered "estimated and biased low."

In certain cases, a result is rejected and deemed to be unusable. "Unusable" in this instance is defined as a result that is not analytically sound and is not considered available for use by the project team. In some cases, the project team may still decide to use a rejected result. An example of this occurrence would be if a result is rejected because it is biased extremely high, yet it is still below the project action limits. A conservative decision may be made to consider this result a non-exceedance, even if its concentration was rejected. For that reason, it is important to examine why a result was rejected. For the most part, however, rejected results are not usable, and the R-qualifier is the only qualifier that has an adverse effect on the availability of data. There are rejected data points in this data set.

1.4 Project-Specific Data Qualifiers and Usability

The following sections examine the data validation qualifiers used on Site 24 groundwater, surface soil, and subsurface soil sample data.

1.4.1 Primary Data Validation Qualifiers

The following data validation qualifiers were applied to one or more analytical results:

- **U** - Not detected. Sample was analyzed for this parameter, but it was not detected at a concentration greater than the reported quantitation limit.
- **UJ** – Not detected, quantitation limit is estimated. Sample was analyzed for this parameter, but it was not detected above the reported quantitation limit. The quantitation limit for this parameter is estimated due to a QC issue.
- **UL** – Not detected, quantitation limit is probably higher than the reported value.
- **J** - Concentration estimated. The parameter was positively identified and the associated numerical value is the approximate concentration of the parameter in the sample.
- **B** – Not detected substantially above the level reported in laboratory or field blanks.
- **L** – Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- **K** – Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- **R –** Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
- **[No qualifier present] or "CLEAR"** - Detected. Qualification was not warranted.

1.4.2 Secondary Data Validation Qualifiers

The following secondary data validation qualifiers were applied to one or more analytical results resulting in the following combinations:

TABLE 1
Secondary Data Validation Qualifiers

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC[1]	Explanation
U	CLEAR	9,325	71.02%	X				Constituent was analyzed for but not detected. Further qualification was not necessary. The result is usable as a nondetect at the reported quantitation limit.
CLEAR	CLEAR	1,426	10.86%	X				Constituent was analyzed for and detected. Further qualification was not necessary (no QA/QC exceedances). The result is usable as a detect as reported.
J	BRL	557	4.24%		X			Constituent was analyzed for and detected. The detection was less than the quantitation limit and J- or B-qualified (as in "below reporting limit") by the laboratory. Further qualification was not necessary (no QA/QC exceedances) except to standardize the qualifier to a valid value. The result is usable as a detect as reported.
UJ	HT	477	3.63%		X			Constituent was analyzed for but not detected. The result was UJ-qualified as "nondetect, estimated quantitation limit" due a holding time exceedance. The holding time exceedance may or may not have been slight and must not have exceeded 2X the limit (assuming temperature, preservation, and sample integrity were not an issue). The QA/QC exceedance (potential bias) was not severe enough to warrant rejection. The result is usable as a nondetect at the reported quantitation limit. Thus, there is no impact on the availability of data for use by the project team.
UL	SSL	328	2.50%		X			Constituent was analyzed for but not detected. The result was UL-qualified as "nondetect, estimated low quantitation limit" due to low recovery for a spiked surrogate (or deuterated monitoring compound). The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a nondetect at the reported quantitation limit. Thus, there is no impact on the availability of data for use by the project team.
B	FBL	183	1.39%		X			Constituent was analyzed for and detected. The result was B-qualified as "not detected substantially above the level reported in laboratory or field blanks" due to field blank contamination. The result is usable as a nondetect as qualified. Thus, there is no impact on the availability of data for use by the project team.

TABLE 1
Secondary Data Validation Qualifiers

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC[1]	Explanation
UJ	ISL	155	1.18%		X			Constituent was analyzed for but not detected. The result was UJ-qualified as "nondetect, estimated quantitation limit" due to low recovery for an internal standard. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a nondetect at the reported quantitation limit. Thus, there is no impact on the availability of data for use by the project team.
UL	BSL	144	1.10%		X			Constituent was analyzed for but not detected. The result was UL-qualified as "nondetect, estimated low quantitation limit" due to low recovery for a laboratory control sample (blank spike). The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a nondetect at the reported quantitation limit. Thus, there is no impact on the availability of data for use by the project team.
J	2C	88	0.67%		X			Constituent was analyzed for and detected. The result was J-qualified as "estimated" due poor dual-column repeatability, usually for PEST/PCBs or EXPLOs. This often occurs when the percent difference between columns exceeds 40%. The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
J	HT	83	0.63%		X			Constituent was analyzed for and detected. The result was J-qualified as "estimated" due to a holding time exceedance. The holding time exceedance may or may not have been slight and must not have exceeded 2X the limit (assuming temperature, preservation, and sample integrity were not an issue). The QA QC exceedance (potential bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
B	CCBL	69	0.53%		X			Constituent was analyzed for and detected. The result was B-qualified as "not detected substantially above the level reported in laboratory or field blanks" due to calibration blank contamination. The result is usable as a nondetect as qualified. Thus, there is no impact on the availability of data for use by the project team.
B	EBL	57	0.43%		X			Constituent was analyzed for and detected. The result was B-qualified as "not detected substantially above the level reported in laboratory or field blanks" due to equipment blank contamination. The result is usable as a nondetect as qualified. Thus, there is no impact on the availability of data for use by the project team.

TABLE 1
Secondary Data Validation Qualifiers

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC[1]	Explanation
B	MBL	51	0.39%		X			Constituent was analyzed for and detected. The result was B-qualified as "not detected substantially above the level reported in laboratory or field blanks" due to method blank contamination. The result is usable as a nondetect as qualified. Thus, there is no impact on the availability of data for use by the project team.
UL	MSL	49	0.37%		X			Constituent was analyzed for but not detected. The result was L-qualified as "biased low" due to low recovery in a matrix spike and/or matrix spike duplicate. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a nondetect as qualified. Thus, there is no impact on the availability of data for use by the project team.
K	SSH	45	0.34%		X			Constituent was analyzed for and detected. The result was K-qualified as "biased high" due to high recovery for a spiked surrogate (or deuterated monitoring compound). The QA/QC exceedance (potential high bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
L	SSL	16	0.12%		X			Constituent was analyzed for and detected. The result was L-qualified as "biased low" due to low recovery for a spiked surrogate (or deuterated monitoring compound). The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
B	TBL	14	0.11%		X			Constituent was analyzed for and detected. The result was B-qualified as "not detected substantially above the level reported in laboratory or field blanks" due to trip blank contamination. The result is usable as a nondetect as qualified. Thus, there is no impact on the availability of data for use by the project team.
J	SSH	11	0.08%		X			Constituent was analyzed for and detected. The result was J-qualified as "estimated" due to high recovery for a spiked surrogate (or deuterated monitoring compound). The QA/QC exceedance (potential high bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.

TABLE 1
Secondary Data Validation Qualifiers

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC[1]	Explanation
R	ICL	11	0.08%			X	Accuracy, Completeness	Constituent was analyzed for and may or may not have been detected. The result was R-qualified as "rejected" or “unreliable” due to relative response factor exceeding the lower limit in an initial calibration. The QA/QC exceedance (extreme low bias) was severe enough that the result should not be used as a detect or as a nondetect for any purpose. This has a negative impact on completeness and a negative impact on accuracy. Because the direction of bias is known, the data user may choose to use these data points (as conservative exceedances understanding that the result may be higher than reported) if the result was detected and exceeded a project action limit. Rejected data is summarized in **Table 1**.
UJ	CCL	6	0.05%		X			Constituent was analyzed for but not detected. The result was UJ-qualified as "nondetect, estimated quantitation limit" due to low recovery in a continuing calibration verification. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a nondetect at the reported quantitation limit. Thus, there is no impact on the availability of data for use by the project team.
J	SD	5	0.04%		X			Constituent was analyzed for and detected. The result was J-qualified as "estimated" due to serial dilution reproducibility (serial dilution percent difference exceeding the upper control limit). The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
UJ	SSL	5	0.04%		X			Constituent was analyzed for but not detected. The result was UJ-qualified as "nondetect, estimated quantitation limit" due to low recovery for a spiked surrogate (or deuterated monitoring compound). The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a nondetect at the reported quantitation limit. Thus, there is no impact on the availability of data for use by the project team.

TABLE 1
Secondary Data Validation Qualifiers

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC[1]	Explanation
J	LR	4	0.03%		X			Constituent was analyzed for and detected. The result was J-qualified as "estimated" because it exceeded the instrument's linear calibration range. In most instances, the laboratory dilutes and reanalyzes samples so that all compounds are reported from the correct concentration range. Results J-qualified due to linear range is a rare occurrence. In some cases, however, schedule prevents the laboratory from performing multiple dilutions. In other cases, the constituents are present at multiple concentration ranges and the laboratory is not required to perform multiple dilutions and analyses. In any case, the QA/QC exceedance was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
K	MSH	4	0.03%		X			Constituent was analyzed for and detected. The result was K-qualified as "biased high" due to high recovery in a matrix spike and/or matrix spike duplicate. The QA/QC exceedance (potential high bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
J	ISL	3	0.02%		X			Constituent was analyzed for and detected. The result was J-qualified as "estimated" due to low recovery for an internal standard. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
R	MSL	3	0.02%			X	Accuracy, Completeness	Constituent was analyzed for and may or may not have been detected. The result was R-qualified as "rejected" due to recovery exceeding the lower limit in a matrix spike and/or matrix spike duplicate. Matrix spike recovery less than 10% often necessitates rejection and matrix spike recovery is sometimes 0% (no recovery). This is indicative of matrix effects or matrix interference and laboratory performance is often assured by acceptable laboratory control sample recoveries. The QA/QC exceedance (extreme low bias) was severe enough that the result should not be used as a detect or as a nondetect for any purpose. This has a negative impact on completeness and a negative impact on accuracy. Because the direction of bias is known, the data user may choose to use these data points (as conservative exceedances understanding that the result may be higher than reported) if the result was detected and exceeded a project action limit. Rejected data is summarized in **Table 1**.

TABLE 1
Secondary Data Validation Qualifiers

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC[1]	Explanation
J	ICB	2	0.02%		X			Constituent was analyzed for and detected. The result was J-qualified as "estimated" due to initial calibration blank (ICB) contamination. The QA/QC exceedance was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
K	LR	2	0.02%		X			Constituent was analyzed for and detected. The result was K-qualified as "biased high" because it exceeded the instrument's linear calibration range. In most instances, the laboratory dilutes and reanalyzes samples so that all compounds are reported from the correct concentration range. Results K-qualified due to linear range is a rare occurrence. In some cases, however, schedule prevents the laboratory from performing multiple dilutions. In other cases, the constituents are present at multiple concentration ranges and the laboratory is not required to perform multiple dilutions and analyses. In any case, the QA/QC exceedance was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
U	ISL	2	0.02%		X			Constituent was analyzed for and not detected. The result was U-qualified as "nondetect" due to low internal standard yield. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a nondetect at the reported quantitation limit. Thus, there is no impact on the availability of data for use by the project team.
UJ	BSL	2	0.02%		X			Constituent was analyzed for but not detected. The result was UJ-qualified as "nondetect, estimated quantitation limit" due to low recovery for a laboratory control sample (blank spike). The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a nondetect at the reported quantitation limit. Thus, there is no impact on the availability of data for use by the project team.
J	DL	1	0.01%		X			Constituent was analyzed for and detected in a diluted run. The detection in the diluted run was less than the quantitation limit and was J-qualified (as in "below reporting limit") by the laboratory. This result has been assessed as being of higher quality than the result associated with the undiluted run due to QA/QC exceedances in the undiluted run. Further qualification of the reported result was not necessary (no QA/QC exceedances). The result is usable as a detect as reported.

TABLE 1
Secondary Data Validation Qualifiers

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC[1]	Explanation
J	SSL	1	0.01%		X			Constituent was analyzed for and detected. The result was J-qualified as "estimated" due to low recovery for a spiked surrogate (or deuterated monitoring compound). The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
L	BSL	1	0.01%		X			Constituent was analyzed for and detected. The result was L-qualified as "biased low" due to low recovery for a laboratory control sample (blank spike). The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
L	MSL	1	0.01%		X			Constituent was analyzed for and detected. The result was L-qualified as "biased low" due to low recovery in a matrix spike and/or matrix spike duplicate. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is usable as a detect as qualified. Thus, there is no impact on the availability of data for use by the project team.
	TOTAL:	13,131	100.00%	86.12	13.77	0.11%		

[1] PARCC is an acronym for “Precision, Accuracy, Representativeness, Completeness and Comparability.” These are basic data quality indicators. See Section 1.5 for more details about PARCC.

1.5 Precision, Accuracy, Representativeness, Completeness, Comparability (PARCC)

1.5.1 Precision

Precision is defined as the agreement between duplicate results, and was characterized by comparing MS/MSD relative percent differences (RPDs), serial dilutions, laboratory replicates, and field duplicate sample results. For this data set, precision was also assessed by examining dual-column reproducibility (percent difference between instrument columns) for pesticides, PCBs and explosives. Although results may have been qualified due to QC exceedances that may suggest an impact on precision, there is no actual significant negative impact on precision unless a data point is deemed unavailable (rejected) due to precision exceedances. No data were rejected due to precision issues.

1.5.2 Accuracy/Bias

Accuracy/bias is a measure of the agreement between an analytical determination and the true value of the parameter being measured. For organic analyses, each sample was spiked with surrogate compounds; and for both organic and inorganic analyses, an MS/MSD and LCS were spiked with a known analyte concentration before preparation. Internal standards, surrogates and MS/MSDs provide a measure of the matrix effects on the analytical accuracy. The LCS demonstrates accuracy of the method and the laboratory's ability to meet the method criteria. Accuracy/bias is also assessed by calibration recoveries. Although results may have been qualified due to QC exceedances which may suggest an impact on accuracy/bias, there is no actual significant negative impact on accuracy unless a data point is deemed unusable (rejected) due to accuracy exceedances. Some results in this data set were rejected due to low or zero percent MS and/or MSD recoveries, or low continuing calibration recoveries, and therefore have a negative impact on the overall accuracy/bias of this data set.

1.5.3 Representativeness

Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition (in this case, the nature and extent of contamination). Representativeness is a subjective parameter and is used to evaluate the efficacy of the sample planning design. In terms of data quality, representativeness was assured because the sampling team followed approved standard operating procedures (SOPs) for sample collection and handling, and the laboratory followed approved SOPs for sample handling, preparation, and analysis. While there were instances of data qualification due to extraction or analysis holding time exceedances, no data were rejected due to SOP non-conformances.

1.5.4 Completeness

Completeness is calculated as the number of analytically-sound results that are available for use compared to the total number of measurements made. All results except those R-qualified as "rejected" are available for use as analytically-sound results. The R-qualifier is the only qualifier that negatively affects a data point's availability. A completeness goal was not specified in the UFP-SAP; therefore, a general 95% completeness goal was applied. Overall, the entire data set was 99.89% complete and the goal was met.

1.5.5 Comparability

Comparability is a qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are sample collection and handling techniques, sample matrix, and analytical methods. In this case, because approved SOPs were used for sample collection and handling, common sample matrices were evaluated (groundwater, surface soil, and subsurface soil), and EPA methods were utilized, the data user may express confidence in the fact that this data set is comparable to others of acceptable data quality. In addition, comparability is controlled by the other PARCC parameters because data sets can be compared with confidence only when precision and accuracy are known. With the exception of data that has been rejected due to quality exceedances, precision and accuracy were

demonstrated to be acceptable and the data user may be confident that this data set is comparable to others of high data quality.

2 Data Quality Evaluation

The purpose of this data quality evaluation is to summarize the findings of the data validation and any effects it found concerning the availability of the data for the investigation at NWS Yorktown Site 24.

2.1 Groundwater Data

This section evaluates the analytical results of the groundwater samples collected June 15th and 16th, 2010.

2.1.1 Groundwater Volatile Organics Data

Volatile organics were analyzed by SW-846 method 8260B. Excluding field quality control samples, 550 distinct data points were generated. The volatile organic compounds (VOCs) data set is 89% complete; 11% of results have been rejected and are not available for use as reported. The validation process issued the following qualifiers for results in the VOCs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC
U	CLEAR	497	90.36%	X			
J	BRL	16	2.91%	X			
R	ICL	11	2.00%			X	A, C_1
B	EBL	7	1.27%		X		
B	FBL	6	1.09%		X		
B	MBL	6	1.09%		X		
UJ	CCL	4	0.73%		X		
CLEAR	CLEAR	3	0.55%	X			
		550	100.00%	93.82%	4.18%	2.00%	

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

The results for 2-Butanone were rejected in all groundwater field samples due to a low relative response factor for this analyte during the initial calibration. This is indicative of a potential extremely low bias.

The remaining groundwater volatile results (539 of 550 results) for this site are available for use to the project team. Please refer to Table 2 for a summary of rejected results for NWS Yorktown Site 24.

2.1.2 Groundwater Semi-Volatile Organics Data

Semi-volatile organics were analyzed by SW-846 methods 8270C and 8270C-SIM. Excluding field quality control samples, 682 distinct data points were generated. The semi-volatile organic compounds (SVOCs) data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the SVOCs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	677	99.27%	X	
B	EBL	2	0.29%		X
J	BRL	2	0.29%	X	
CLEAR	CLEAR	1	0.15%	X	
		682	100.00%	99.71%	0.29%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.1.3 Groundwater Pesticides and PCBs Data

Pesticides and PCBs were analyzed by SW-846 methods 8081A and 8082, respectively. Excluding field quality control samples, 308 distinct data points were generated. The pesticides and PCB data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the Pesticides and PCBs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	271	87.99%	X	
J	2C	14	4.55%		X
B	FBL	12	3.90%		X
B	EBL	6	1.95%		X
UL	BSL	4	1.30%		X
J	BRL	1	0.32%	X	
		308	100.00%	88.31%	11.69%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.1.4 Groundwater Explosives Data

Explosives were analyzed by SW-846 method 8330. Excluding field quality control samples, 154 distinct data points were generated. The explosives data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the explosives fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	138	89.61%	X	
UL	BSL	11	7.14%		X
J	BRL	5	3.25%	X	
		154	100.00%	92.86%	7.14%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.1.5 Groundwater Total Metals Data

Total metals were analyzed by SW-846 methods 6010B, 7470A, and 9012. Excluding field quality control samples, 264 distinct data points were generated. The total metals (METALs) data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the METALs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	147	55.68%	X	
J	BRL	35	13.26%	X	
B	CCBL	27	10.23%		X
B	EBL	27	10.23%		X
CLEAR	CLEAR	26	9.85%	X	
B	MBL	2	0.76%		X
		264	100.00%	78.79%	21.21%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.1.6 Groundwater Filtered Metals Data

Filtered metals were analyzed by SW-846 methods 6010B and 7470A. Excluding field quality control samples, 253 distinct data points were generated. The filtered metals (FMETALs) data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the FMETALs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	129	50.99%	X	
J	BRL	37	14.62%	X	
B	FBL	26	10.28%		X
CLEAR	CLEAR	25	9.88%	X	
B	CCBL	24	9.49%		X
B	EBL	12	4.74%		X
		253	100.00%	75.49%	24.51%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.1.7 Groundwater Wet Chemistry Data

The following Wet Chemistry parameters were analyzed by the respective methods: Alkalinity by EPA Method 310.2 , Select Ions by EPA Method 300.0, MEE by RSK-175, pH by Standard Methods 4500 (electrometric method), Sulfide by Standard Methods 4500 (iodometric), and TOC by EPA SW-846 Method 9060. Excluding field quality control samples, 33 distinct data points were generated. The wet chemistry data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the wet chemistry fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported
CLEAR	CLEAR	15	45.45%	X
U	CLEAR	12	36.36%	X
J	BRL	6	18.18%	X
		33	100.00%	100.00%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.2 Surface Soil Data

This section evaluates the analytical results of the surface soil samples collected April 14th -20th, 2010.

2.2.1 Surface Soil Volatile Organics Data

Volatile organics were analyzed by SW-846 method 8260B. Excluding field quality control samples, 1,700 distinct data points were generated. The volatile organic compounds (VOCs) data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the VOCs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	1,431	84.18%	X	
UJ	ISL	103	6.06%		X
B	FBL	78	4.59%		X
K	SSH	22	1.29%		X
UL	MSL	18	1.06%		X
B	TBL	14	0.82%		X
J	SSH	11	0.65%		X
CLEAR	CLEAR	9	0.53%	X	
J	BRL	4	0.24%	X	
J	LR	4	0.24%		X
J	ISL	2	0.12%		X
U	ISL	2	0.12%		X
B	MBL	1	0.06%		X
J	DL	1	0.06%		X
		1,700	100.00%	84.94%	15.06%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.2.2 Surface Soil Semi-Volatile Organics Data

Semi-volatile organics were analyzed by SW-846 methods 8270C and 8270C-SIM. Excluding field quality control samples, 2,108 distinct data points were generated. The semi-volatile organic compounds (SVOCs) data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the SVOCs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	1,892	89.75%	X	
J	BRL	126	5.98%	X	
UJ	ISL	47	2.23%		X
UL	BSL	30	1.42%		X
CLEAR	CLEAR	10	0.47%	X	
J	ICB	1	0.05%		X
J	ISL	1	0.05%		X
K	MSH	1	0.05%		X
		2,108	100.00%	96.20%	3.80%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.2.3 Surface Soil Pesticides and PCBs Data

Pesticides and PCBs were analyzed by SW-846 methods 8081A and 8082, respectively. Excluding field quality control samples, 952 distinct data points were generated. The pesticides and PCB data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the Pesticides and PCBs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
UJ	HT	451	47.37%		X
U	CLEAR	209	21.95%	X	
UL	SSL	135	14.18%		X
J	HT	81	8.51%		X
J	2C	54	5.67%		X
J	BRL	11	1.16%	X	
L	SSL	7	0.74%		X
UL	BSL	2	0.21%		X
CLEAR	CLEAR	1	0.11%	X	
L	BSL	1	0.11%		X
		952	100.00%	23.21%	76.79%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.2.4 Surface Soil Explosives Data

Explosives were analyzed by SW-846 method 8330. Excluding field quality control samples, 476 distinct data points were generated. The explosives data set is 99.58% complete; 0.42% of results have been rejected and are not available for use as reported. The validation process issued the following qualifiers for results in the explosives fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC
U	CLEAR	447	93.91%	X			
UL	BSL	23	4.83%		X		
UL	MSL	3	0.63%		X		
R	MSL	2	0.42%			X	A, C_1
CLEAR	CLEAR	1	0.21%	X			
		476	100.00%	94.12%	5.46%	0.42%	

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

Results for Tetryl in samples YS24-SS03-0410 and YS24-SS17-0410 were rejected due to zero percent recovery of Tetryl in the MS and/or MSD performed on these samples. This is a commonly-rejected compound due to typical poor instrument response and this is indicative of a potential extremely low bias for Tetryl in these two samples.

The remaining surface soil explosive results (474 of 476 results) for this site are available for use to the project team. Please refer to Table 2 for a summary of rejected results for NWS Yorktown Site 24.

2.2.5 Surface Soil Metals Data

Metals were analyzed by SW-846 methods 6010B, 7471A, and 9012. Excluding field quality control samples, 816 distinct data points were generated. The metals data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the metals fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
CLEAR	CLEAR	443	54.29%	X	
J	BRL	182	22.30%	X	
U	CLEAR	160	19.61%	X	
B	MBL	14	1.72%		X
B	CCBL	5	0.61%		X
UL	MSL	4	0.49%		X
J	SD	3	0.37%		X
K	MSH	3	0.37%		X
B	EBL	2	0.25%		X
		816	100.00%	96.20%	3.80%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.2.6 Surface Soil Wet Chemistry Data

Surface soil samples were analyzed in the Wet Chemistry fraction for pH by SW-846 method 9045 and TOC by the Lloyd Kahn Method. Excluding field quality control samples, 33 distinct data points were generated. No qualifiers were applied and the wet chemistry data set is 100 percent complete; all results are available for use as reported.

2.2.7 Surface Soil Grain Size Data

Grain Size (sieve only, no hydrometer) was analyzed by ASTM method D422. Excluding field quality control samples, 279 distinct data points were generated. Although grain size data were not formally validated, the data were still subject to many of the verification and validation steps outlined in Worksheet 34 and 35 of the UFP-SAP work plan. No qualifiers were applied and the grain size data set is 100 percent complete; all results are available for use as reported.

2.3 Subsurface Soil Data

This section evaluates the analytical results of the subsurface soil samples collected April 15th -22th, 2010.

2.3.1 Subsurface Soil Volatile Organics Data

Volatile organics were analyzed by SW-846 method 8260B. Excluding field quality control samples, 1,200 distinct data points were generated. The volatile organic compounds (VOCs) data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the VOCs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	1,086	90.50%	X	
B	FBL	61	5.08%		X
K	SSH	23	1.92%		X
UL	MSL	21	1.75%		X
UJ	ISL	5	0.42%		X
J	BRL	2	0.17%	X	
K	LR	2	0.17%		X
		1,200	100.00%	90.67%	9.33%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.3.2 Subsurface Soil Semi-Volatile Organics Data

Semi-volatile organics were analyzed by SW-846 methods 8270C and 8270C-SIM. Excluding field quality control samples, 1,489 distinct data points were generated. The semi-volatile organic compounds (SVOCs) data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the SVOCs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	1,408	94.56%	X	
UL	BSL	42	2.82%		X
J	BRL	26	1.75%	X	
CLEAR	CLEAR	6	0.40%	X	
UJ	BSL	2	0.13%		X
UJ	CCL	2	0.13%		X
UL	MSL	2	0.13%		X
J	ICB	1	0.07%		X
		1,489	100.00%	96.71%	3.29%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.3.3 Subsurface Soil Pesticides and PCBs Data

Pesticides and PCBs were analyzed by SW-846 methods 8081A and 8082, respectively. Excluding field quality control samples, 672 distinct data points were generated. The pesticides and PCBs data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the Pesticides and PCBs fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
U	CLEAR	384	57.14%	X	
UL	SSL	193	28.72%		X
UJ	HT	26	3.87%		X
J	2C	20	2.98%		X
UL	BSL	15	2.23%		X
L	SSL	9	1.34%		X
CLEAR	CLEAR	8	1.19%	X	
J	BRL	7	1.04%	X	
UJ	SSL	5	0.74%		X
J	HT	2	0.30%		X
B	EBL	1	0.15%		X
B	MBL	1	0.15%		X
J	SSL	1	0.15%		X
		672	100.00%	59.38%	40.63%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.3.4 Subsurface Soil Explosives Data

Explosives were analyzed by SW-846 method 8330. Excluding field quality control samples, 335 distinct data points were generated. The explosives data set is 99.7% complete; 0.30% of results have been rejected and are not available for use as reported. The validation process issued the following qualifiers for results in the explosives fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact of PARCC
U	CLEAR	317	94.63%	X			
UL	BSL	17	5.07%		X		
R	MSL	1	0.30%			X	A, C_1
		335	100.00%	94.63%	5.07%	0.30%	

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

The result for Tetryl in sample YS24-SB04-0.5-2-0410 was rejected due to zero percent recovery of Tetryl in both the MS and MSD performed on this sample. This is a commonly-rejected compound due to typical poor instrument response and this is indicative of a potential extremely low bias for Tetryl in this sample.

The remaining subsurface soil explosive results (354 of 355 results) for this site are available for use to the project team. Please refer to Table 2 for a summary of rejected results for NWS Yorktown Site 24.

2.3.5 Subsurface Soil Metals Data

Metals were analyzed by SW-846 methods 6010B, 7471A, and 9012. Excluding field quality control samples, 576 distinct data points were generated. The metals data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results in the metals fraction:

DV Qual	DV Qual Code	Count	Percent	Available as Reported	Available as Qualified
CLEAR	CLEAR	315	54.69%	X	
U	CLEAR	120	20.83%	X	
J	BRL	97	16.84%	X	
B	MBL	27	4.69%		X
B	CCBL	13	2.26%		X
J	SD	2	0.35%		X
L	MSL	1	0.17%		X
UL	MSL	1	0.17%		X
		576	100.00%	92.36%	7.64%

Please see the table in section 1.4.2 for an explanation of qualifications and their impact on data usability.

2.3.6 Subsurface Soil Wet Chemistry Data

Subsurface soils were analyzed in the Wet Chemistry fraction for pH by SW-846 9045 and TOC by the Lloyd Kahn Method. Excluding field quality control samples, 42 distinct data points were generated. No qualifiers were applied and the wet chemistry data set is 100 percent complete; all results are available for use as reported.

2.3.7 Subsurface Soil Grain Size Data

Grain Size (sieve only, no hydrometer) was analyzed by ASTM method D422. Excluding field quality control samples, 180 distinct data points were generated. Although grain size data were not formally validated, the data were still subject to many of the verification and validation steps outlined in Worksheet 34 and 35 of the UFP-SAP work plan. No qualifiers were applied and the grain size data set is 100 percent complete; all results are available for use as reported.

3 Evaluation of Data Against Project Action Limits

It is a common occurrence for achieved quantitation limits to be greater than PALs or for QLs to be elevated to greater than what was expected or requested. In many cases, PALs are simply unreasonably low. These instances of QL v. PAL exceedance are acknowledged and detailed by Worksheet 15 of the project-specific UFP-SAP:

> There are those instances where a laboratory QL for a specific constituent will be above its PAL. In those cases, an undetected value will be considered as the analyte not being present. When samples have other detected constituents and an undetected analyte with the QL above the PAL, the undetected compounds will be compared to site-specific background values (if available). If the background value is above the QL, the compound will not be considered to pose unacceptable risk. If the background values are below the QL, then the compound will be included in the uncertainty section of the RI report.

In the instance where non-detect quantitation limits are greater than project action limits, the results are available for use as non-detects, but their use adds uncertainty to the conclusions drawn. There are a variety of potentially unavoidable reasons why the quantitation limits of non-detect results may exceed project action limits:

- If a criterion (project action limit) is unreasonably low, current instrumentation technology may not be able to achieve a QL less than the PAL.
- If a soil sample is characterized by high percent moisture, the reporting limits will be raised such that the concentrations and quantitation limits are reported on a dry-weight basis.

Nondetect U, UL or UJ-values were compared to the following screening criteria guidelines, as applicable, and used as the PALs:

- **Groundwater**—Federal MCLs and USEPA RSLs for Tap Water
- **Surface Soils**—USEPA RSLs for Residential Soil and Ecological Screening Values (ESVs) (from literature compiled for use at WPNSTA Yorktown and Cheatham Annex for plants and soil invertebrates).
- **Subsurface Soils**—USEPA RSLs for Residential Soil and ESVs (from literature compiled for use at WPNSTA Yorktown and Cheatham Annex for plants and soil invertebrates).

In groundwater samples, 55 of the 2047 non-detect results had an MDL that was greater than the MCL. In 431 of the non-detect results, the MDL was greater than the RSL. See Tables 3-1 and 3-2 for details on the specific results. Results were compared to the MDL instead of the QL because it gives the lowest level that a laboratory has proven with 99% confidence that they can accurately quantitate a constituent. Any results between the QL and MDL were J-qualified by the laboratory. When the MDL is great than a PAL, this means that the laboratory is not able to accurately quantitate that particular constituent at a level low enough to compare to the PAL. In the MCL comparison, it is noted that there aren't any cases where the QL was greater than background levels. However, in the RSL comparison there were 44 instances where the QL was greater than the background. According to the guidance in the UFP-SAP regarding background levels, uncertainty exists for these results.

In surface soil samples, 57 of the 5071 non-detect results had an MDL that was greater than the RSL. In 34 of the non-detect results, the MDL was greater than the ESV. See Tables 3-3 and 3-4 for specific results. In the RSL and ESV comparisons, none of the QLs were greater than background.

In subsurface soil samples, 46 of 3750 non-detect results had an MDL that was greater than the RSL. See Table 3-5 for specific results. In the RSL comparison, none of the QLs were greater than background levels.

In addition to an examination of non-detect constituents with values greater than the PALs, it is also worthwhile to consider the effect of biased results near their respective PALs. Table 3-6 indicates potentially affected data that was relatively close to the associated PAL and qualified as potentially biased by the data validator. These results are available for use by the project team.

4 Overall Assessment

The quality of the data reported for the groundwater, surface and subsurface soil sampling at NWS Yorktown Site 24 in April of 2010 is of excellent quality. A large majority (99.89%) of the data in this data set is available for use either as reported or as qualified, and only 14 of 13,131 of results (0.11%) were rejected due to QA/QC issues during validation.

TABLE 2

Summary of Rejected Data

Matrix	Sample_ID	Analysis_Group	Chem_Name	CAS_Number	Ana_Value	Lab_Qual	DV_Qual	DV_Qual_Code	Units
SS	YS24-SS17-0410	EXPLO	Tetryl	479-45-8	3	U	R	MSL	MG_KG
SB	YS24-SB04-0.5-2-0410	EXPLO	Tetryl	479-45-8	3	U	R	MSL	MG_KG
SS	YS24-SS03-0410	EXPLO	Tetryl	479-45-8	3.00	U	R	MSL	MG_KG
GW	YS24-GW08S-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW09S-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW02D-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW01D-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW06S-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW10S-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW04S-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW07S-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW05S-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW03S-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L
GW	YS24-GW03SP-0610	VOA	2-Butanone	78-93-3	2.5	U	R	ICL	UG_L

Reason Codes (DV_Qual_Code)

MSL Matrix Spike - Low Recovery

ICL Initial Calibration – Low Relative Response Factors

TABLE 3-1

Groundwater MCL Comparison- Samples where the MDL is greater than the MCL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	MCL	Background
YS24-GW08S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW09S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW02D-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW01D-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW06S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW10S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW04S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW07S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW05S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW03S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW03SP-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.2	NC
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.5	NC
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.5	NC
YS24-GW08S-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW09S-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW02D-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW01D-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW06S-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW10S-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW04S-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW07S-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC

TABLE 3-1

Groundwater MCL Comparison- Samples where the MDL is greater than the MCL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	MCL	Background
YS24-GW05S-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW03S-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW03SP-0610	METAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW01D-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW02D-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW03S-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW03SP-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW04S-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW05S-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW06S-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW07S-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW08S-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW09S-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC
YS24-GW10S-0610	FMETAL	6010B	Thallium	7440-28-0	10	UG_L	U	CLEAR	3	10	2	NC

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW08S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW09S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW02D-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW01D-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW06S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW10S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW04S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW07S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW05S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW03S-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW03SP-0610	VOA	8260B	1,2-Dibromo-3-chloropropane	96-12-8	0.5	UG_L	U	CLEAR	0.25	0.5	0.00032	NC	N
YS24-GW08S-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW09S-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW02D-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW01D-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW06S-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW10S-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW04S-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW07S-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW05S-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW03S-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW03SP-0610	VOA	8260B	1,2-Dibromoethane	106-93-4	0.5	UG_L	U	CLEAR	0.04	0.5	0.0065	NC	N
YS24-GW08S-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW09S-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW02D-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW01D-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW06S-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW10S-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW04S-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW07S-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW05S-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW03S-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW03SP-0610	EXPLO	8330	1,3-Dinitrobenzene	99-65-0	2.5	UG_L	U	CLEAR	0.45	2.5	0.37	NC	N
YS24-GW10S-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW01D-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW02D-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW03S-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW03SP-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW04S-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW05S-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW06S-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW07S-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW08S-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW09S-0610	SVOA	8270C	2,2'-Oxybis(1-chloropropane)	108-60-1	5	UG_L	U	CLEAR	0.64	5	0.32	NC	N
YS24-GW08S-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW09S-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW02D-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW01D-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW06S-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW10S-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW04S-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW07S-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW05S-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW03S-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW03SP-0610	EXPLO	8330	2,4-Dinitrotoluene	121-14-2	2.5	UG_L	U	CLEAR	0.28	2.5	0.22	NC	N
YS24-GW08S-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW09S-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW02D-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW01D-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW06S-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW10S-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW04S-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW07S-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW05S-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW03S-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW03SP-0610	EXPLO	8330	2-Nitrotoluene	88-72-2	5	UG_L	U	CLEAR	0.4	5	0.31	NC	N
YS24-GW10S-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW01D-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW02D-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW03S-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW03SP-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW04S-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW05S-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW06S-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW07S-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW08S-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW09S-0610	SVOA	8270C	3,3'-Dichlorobenzidine	91-94-1	5	UG_L	U	CLEAR	4	5	0.15	NC	N
YS24-GW10S-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW01D-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW02D-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW03S-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW03SP-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW04S-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW05S-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW06S-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW07S-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW08S-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW09S-0610	SVOA	8270C	4,6-Dinitro-2-methylphenol	534-52-1	10	UG_L	U	CLEAR	0.54	10	0.29	NC	N
YS24-GW10S-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW01D-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW02D-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW03S-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW03SP-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW04S-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW05S-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW06S-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW07S-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW08S-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW09S-0610	SVOA	8270C	4-Chloroaniline	106-47-8	5	UG_L	U	CLEAR	0.7	5	0.34	NC	N
YS24-GW10S-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW01D-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW02D-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW03S-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW03SP-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW04S-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW05S-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW06S-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW07S-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW08S-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW09S-0610	SVOA	8270C	4-Nitrophenol	100-02-7	10	UG_L	U	CLEAR	0.5	10	0.12	NC	N
YS24-GW10S-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW01D-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW02D-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW03S-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW03SP-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW04S-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW05S-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW06S-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW07S-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW08S-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW09S-0610	PEST/PCB	8081A	Aldrin	309-00-2	0.05	UG_L	U	CLEAR	0.005	0.05	0.004	NC	N
YS24-GW08S-0610	METAL	6010B	Antimony	7440-36-0	7.4	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW09S-0610	METAL	6010B	Antimony	7440-36-0	6.9	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW02D-0610	METAL	6010B	Antimony	7440-36-0	7.5	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW01D-0610	METAL	6010B	Antimony	7440-36-0	7.4	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW06S-0610	METAL	6010B	Antimony	7440-36-0	6.8	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW10S-0610	METAL	6010B	Antimony	7440-36-0	6	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW04S-0610	METAL	6010B	Antimony	7440-36-0	7.7	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW07S-0610	METAL	6010B	Antimony	7440-36-0	5.3	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW05S-0610	METAL	6010B	Antimony	7440-36-0	8.2	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW03S-0610	METAL	6010B	Antimony	7440-36-0	7	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW03SP-0610	METAL	6010B	Antimony	7440-36-0	5.9	UG_L	B	EBL	2	10	1.5	18.8	N
YS24-GW08S-0610	FMETAL	6010B	Antimony	7440-36-0	4.7	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW09S-0610	FMETAL	6010B	Antimony	7440-36-0	9.5	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW02D-0610	FMETAL	6010B	Antimony	7440-36-0	6.2	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW01D-0610	FMETAL	6010B	Antimony	7440-36-0	10.3	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW04S-0610	FMETAL	6010B	Antimony	7440-36-0	6.7	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW07S-0610	FMETAL	6010B	Antimony	7440-36-0	7.8	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW03S-0610	FMETAL	6010B	Antimony	7440-36-0	7.4	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW03SP-0610	FMETAL	6010B	Antimony	7440-36-0	6.6	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW06S-0610	FMETAL	6010B	Antimony	7440-36-0	5.7	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW05S-0610	FMETAL	6010B	Antimony	7440-36-0	5.7	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW10S-0610	FMETAL	6010B	Antimony	7440-36-0	6.2	UG_L	B	FBL	2	10	1.5	9.7	Y
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1016	12674-11-2	0.93	UG_L	U	CLEAR	0.36	0.93	0.26	NC	N
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1221	11104-28-2	1.3	UG_L	U	CLEAR	1.3	1.3	0.0068	NC	N
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1232	11141-16-5	0.93	UG_L	U	CLEAR	0.58	0.93	0.0068	NC	N
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1242	53469-21-9	0.63	UG_L	U	CLEAR	0.32	0.63	0.034	NC	N
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1248	12672-29-6	0.63	UG_L	U	CLEAR	0.42	0.63	0.034	NC	N
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1254	11097-69-1	0.63	UG_L	U	CLEAR	0.16	0.63	0.034	NC	N
YS24-GW10S-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW01D-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW02D-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW03S-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW03SP-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW04S-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW05S-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW06S-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW07S-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW08S-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW09S-0610	PEST/PCB	8082	Aroclor-1260	11096-82-5	0.93	UG_L	U	CLEAR	0.28	0.93	0.034	NC	N
YS24-GW08S-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW09S-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW02D-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW01D-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW06S-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW10S-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW04S-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW07S-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW05S-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW03S-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW03SP-0610	METAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	2.28	Y
YS24-GW01D-0610	FMETAL	6010B	Arsenic	7440-38-2	3.6	UG_L	B	CCBL	2.5	10	0.045	1.37	Y
YS24-GW02D-0610	FMETAL	6010B	Arsenic	7440-38-2	5.7	UG_L	B	CCBL	2.5	10	0.045	1.37	Y
YS24-GW03S-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW03SP-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW04S-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW05S-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW06S-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW07S-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW08S-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW09S-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW10S-0610	FMETAL	6010B	Arsenic	7440-38-2	10	UG_L	U	CLEAR	2.5	10	0.045	1.37	Y
YS24-GW10S-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW01D-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW02D-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW03S-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW03SP-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW04S-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW05S-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW06S-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW07S-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW08S-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW09S-0610	SVOA	8270C	Atrazine	1912-24-9	5	UG_L	U	CLEAR	1.5	5	0.29	NC	N
YS24-GW08S-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW09S-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW02D-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW01D-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW06S-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW10S-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW04S-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW07S-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW05S-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW03S-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW03SP-0610	SVOA	8270C_SIM	Benzo(a)pyrene	50-32-8	0.2	UG_L	U	CLEAR	0.01	0.2	0.0029	NC	N
YS24-GW10S-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW01D-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW02D-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW03S-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW03SP-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW04S-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW05S-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW06S-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW07S-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW08S-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW09S-0610	SVOA	8270C	bis(2-Chloroethyl)ether	111-44-4	5	UG_L	U	CLEAR	0.92	5	0.012	NC	N
YS24-GW01D-0610	METAL	6010B	Chromium	7440-47-3	1.1	UG_L	B	CCBL	0.75	10	0.043	15.1	N
YS24-GW05S-0610	METAL	6010B	Chromium	7440-47-3	0.82	UG_L	B	CCBL	0.75	10	0.043	15.1	N
YS24-GW08S-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW09S-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW02D-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW06S-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW10S-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW04S-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW07S-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW03S-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW03SP-0610	METAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	15.1	N
YS24-GW01D-0610	FMETAL	6010B	Chromium	7440-47-3	1.3	UG_L	B	CCBL	0.75	10	0.043	NC	N
YS24-GW02D-0610	FMETAL	6010B	Chromium	7440-47-3	0.85	UG_L	B	CCBL	0.75	10	0.043	NC	N
YS24-GW07S-0610	FMETAL	6010B	Chromium	7440-47-3	1	UG_L	B	CCBL	0.75	10	0.043	NC	N
YS24-GW09S-0610	FMETAL	6010B	Chromium	7440-47-3	1.5	UG_L	B	CCBL	0.75	10	0.043	NC	N
YS24-GW03S-0610	FMETAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	NC	N
YS24-GW03SP-0610	FMETAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	NC	N
YS24-GW04S-0610	FMETAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	NC	N
YS24-GW05S-0610	FMETAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	NC	N
YS24-GW06S-0610	FMETAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	NC	N
YS24-GW08S-0610	FMETAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	NC	N
YS24-GW10S-0610	FMETAL	6010B	Chromium	7440-47-3	10	UG_L	U	CLEAR	0.75	10	0.043	NC	N
YS24-GW08S-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW09S-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW02D-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW01D-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW06S-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW10S-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW04S-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW07S-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW05S-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW03S-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW03SP-0610	METAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	20.6	N
YS24-GW01D-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW02D-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW03S-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW03SP-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW04S-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW05S-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW06S-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW07S-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW08S-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW09S-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW10S-0610	FMETAL	6010B	Cobalt	7440-48-4	5	UG_L	U	CLEAR	1.5	5	1.1	0.7	Y
YS24-GW10S-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW01D-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW02D-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW03S-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW03SP-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW04S-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW05S-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW06S-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW07S-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW08S-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW09S-0610	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	5	UG_L	U	CLEAR	1.2	5	0.0029	NC	N
YS24-GW10S-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW01D-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW02D-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW03S-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW03SP-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW04S-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW05S-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW06S-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW07S-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW08S-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW09S-0610	PEST/PCB	8081A	Heptachlor	76-44-8	0.05	UG_L	U	CLEAR	0.045	0.05	0.015	NC	N
YS24-GW10S-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW01D-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW02D-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW03S-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW03SP-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW04S-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW05S-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW06S-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW07S-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW08S-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW09S-0610	SVOA	8270C	Hexachlorobenzene	118-74-1	5	UG_L	U	CLEAR	0.63	5	0.042	NC	N
YS24-GW10S-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW01D-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW02D-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW03S-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW03SP-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW04S-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW05S-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW06S-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW07S-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW08S-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW09S-0610	SVOA	8270C	Indeno(1,2,3-cd)pyrene	193-39-5	5	UG_L	U	CLEAR	0.5	5	0.029	NC	N
YS24-GW01D-0610	SVOA	8270C	Naphthalene	91-20-3	5	UG_L	U	CLEAR	0.76	5	0.14	NC	N
YS24-GW02D-0610	SVOA	8270C	Naphthalene	91-20-3	5	UG_L	U	CLEAR	0.76	5	0.14	NC	N
YS24-GW05S-0610	SVOA	8270C	Naphthalene	91-20-3	5	UG_L	U	CLEAR	0.76	5	0.14	NC	N
YS24-GW08S-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW09S-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW02D-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW01D-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW06S-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW10S-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW04S-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW07S-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW05S-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW03S-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW03SP-0610	EXPLO	8330	Nitrobenzene	98-95-3	2.5	UG_L	U	CLEAR	0.31	2.5	0.12	NC	N
YS24-GW10S-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW01D-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW02D-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW03S-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW03SP-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW04S-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW05S-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW06S-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW07S-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW08S-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW09S-0610	SVOA	8270C	n-Nitroso-di-n-propylamine	621-64-7	5	UG_L	U	CLEAR	1.1	5	0.0096	NC	N
YS24-GW10S-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW01D-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW02D-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW03S-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW03SP-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW04S-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW05S-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW06S-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW07S-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW08S-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW09S-0610	SVOA	8270C	Pentachlorophenol	87-86-5	10	UG_L	U	CLEAR	0.84	10	0.56	NC	N
YS24-GW08S-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW09S-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW02D-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW01D-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW06S-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW10S-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW04S-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW07S-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW03S-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW03SP-0610	EXPLO	8330	RDX	121-82-4	4	UG_L	U	CLEAR	1.1	4	0.61	NC	N
YS24-GW10S-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW01D-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW02D-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW03S-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW03SP-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW04S-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW05S-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW06S-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW07S-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N

TABLE 3-2

Groundwater RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-GW08S-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW09S-0610	PEST/PCB	8081A	Toxaphene	8001-35-2	2.5	UG_L	U	CLEAR	1	2.5	0.061	NC	N
YS24-GW08S-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW09S-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW02D-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW01D-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW06S-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW10S-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW04S-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW07S-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW05S-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW03S-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N
YS24-GW03SP-0610	VOA	8260B	Vinyl chloride	75-01-4	0.5	UG_L	U	CLEAR	0.07	0.5	0.016	NC	N

TABLE 3-3

Surface Soil RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-SS22-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	20	200	15	NC	N
YS24-SS23-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	220	UG_KG	U	CLEAR	23	220	15	NC	N
YS24-SS24-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SS27-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	180	UG_KG	U	CLEAR	19	180	15	NC	N
YS24-SS28-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS29-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	20	200	15	NC	N
YS24-SS30-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SS16-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS20-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS05-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS21-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	20	200	15	NC	N
YS24-SS01-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS01P-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS02-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SS11P-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	230	UG_KG	U	CLEAR	24	230	15	NC	N
YS24-SS12-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS13-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS14-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	20	200	15	NC	N
YS24-SS11-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	UJ	ISL	19	190	15	NC	N
YS24-SS15-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS03-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SS07-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS09-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SS10-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SS22-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SS23-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	220	UG_KG	U	CLEAR	24	220	15	NC	N
YS24-SS24-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS25-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	180	UG_KG	U	CLEAR	20	180	15	NC	N
YS24-SS26-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS26P-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS27-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	180	UG_KG	U	CLEAR	20	180	15	NC	N
YS24-SS28-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS29-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SS30-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS16-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS17-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SS18-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SS19-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS20-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS04-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS05-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS06-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SS21-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SS01-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N

TABLE 3-3

Surface Soil RSL Comparison- Samples where the MDL is greater than the RSL

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	RSL	Background	QL greater than Background?
YS24-SS01P-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS02-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS08-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SS11P-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	230	UG_KG	U	CLEAR	25	230	15	NC	N
YS24-SS12-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS13-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS14-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SS15-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS11-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	UJ	ISL	20	190	15	NC	N
YS24-SS03-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS07-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SS09-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SS10-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	20	190	15	NC	N

TABLE 3-4

Surface Soil ESV Comparison- Samples where the MDL is greater than the ESV

Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	QL	ECO	Background	QL greater than Background?
YS24-SS22-0410	SVOA	8270C	Atrazine	1912-24-9	200	UG_KG	U	CLEAR	20	200	11.9	NC	N
YS24-SS23-0410	SVOA	8270C	Atrazine	1912-24-9	220	UG_KG	U	CLEAR	23	220	11.9	NC	N
YS24-SS24-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS25-0410	SVOA	8270C	Atrazine	1912-24-9	180	UG_KG	U	CLEAR	18	180	11.9	NC	N
YS24-SS26-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS26P-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS27-0410	SVOA	8270C	Atrazine	1912-24-9	180	UG_KG	U	CLEAR	18	180	11.9	NC	N
YS24-SS28-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	20	190	11.9	NC	N
YS24-SS29-0410	SVOA	8270C	Atrazine	1912-24-9	200	UG_KG	U	CLEAR	20	200	11.9	NC	N
YS24-SS30-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS31-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS16-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS17-0410	SVOA	8270C	Atrazine	1912-24-9	200	UG_KG	U	CLEAR	20	200	11.9	NC	N
YS24-SS18-0410	SVOA	8270C	Atrazine	1912-24-9	200	UG_KG	U	CLEAR	20	200	11.9	NC	N
YS24-SS19-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS20-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS04-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	20	190	11.9	NC	N
YS24-SS05-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	20	190	11.9	NC	N
YS24-SS06-0410	SVOA	8270C	Atrazine	1912-24-9	200	UG_KG	U	CLEAR	21	200	11.9	NC	N
YS24-SS21-0410	SVOA	8270C	Atrazine	1912-24-9	200	UG_KG	U	CLEAR	20	200	11.9	NC	N
YS24-SS01-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS01P-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS02-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS08-0410	SVOA	8270C	Atrazine	1912-24-9	200	UG_KG	U	CLEAR	20	200	11.9	NC	N
YS24-SS11P-0410	SVOA	8270C	Atrazine	1912-24-9	230	UG_KG	U	CLEAR	23	230	11.9	NC	N
YS24-SS12-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	20	190	11.9	NC	N
YS24-SS11-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	UJ	ISL	19	190	11.9	NC	N
YS24-SS13-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS14-0410	SVOA	8270C	Atrazine	1912-24-9	200	UG_KG	U	CLEAR	20	200	11.9	NC	N
YS24-SS15-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS03-0410	SVOA	8270C	Atrazine	1912-24-9	94	UG_KG	U	CLEAR	19	94	11.9	NC	N
YS24-SS07-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	20	190	11.9	NC	N
YS24-SS09-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N
YS24-SS10-0410	SVOA	8270C	Atrazine	1912-24-9	190	UG_KG	U	CLEAR	19	190	11.9	NC	N

TABLE 3-5

Subsurface Soil RSL Comparison- Samples where the MDL is greater than the RSL

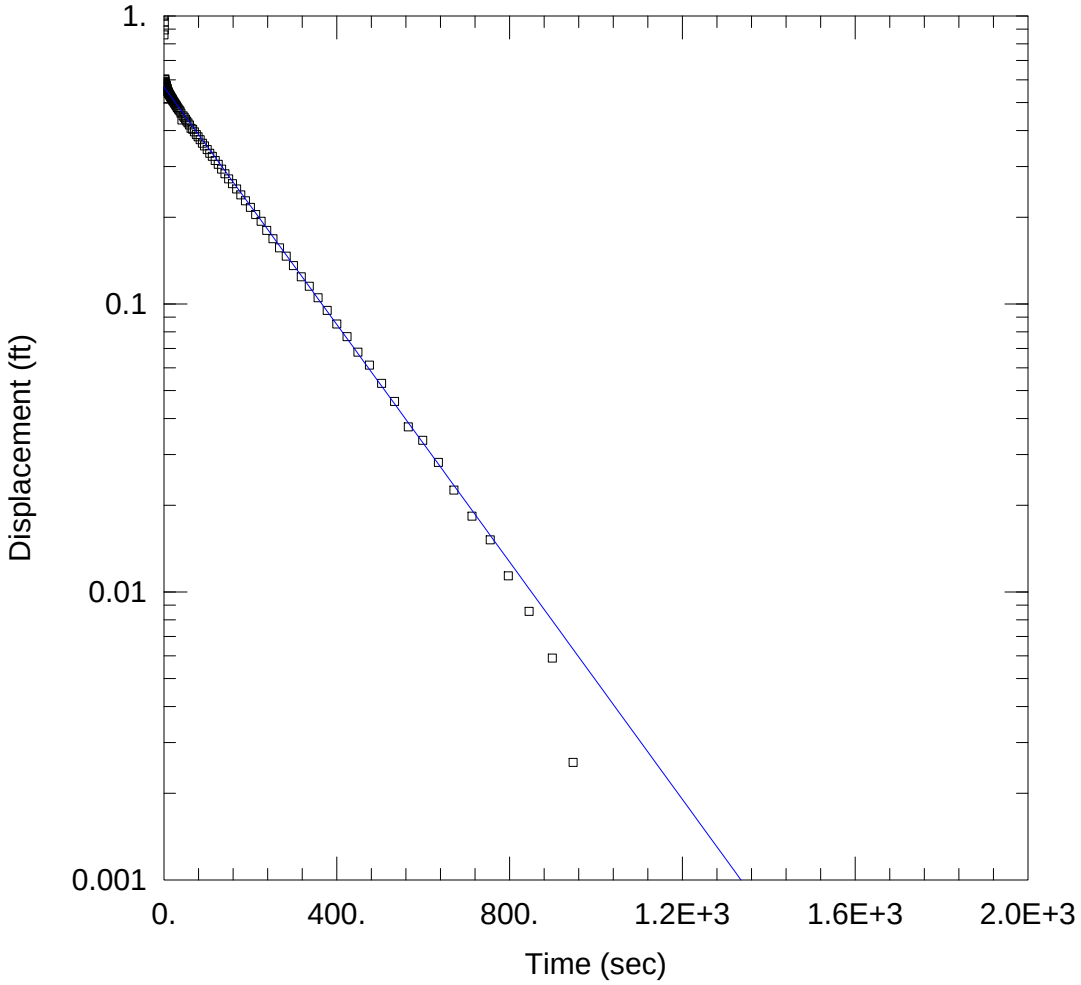
Sample Name	Analysis Group	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Validator Qualifier Code	MDL	RSL	QL	Background	QL greater than Background?
YS24-SB20B-7-8-0410	METAL	6010B	Arsenic	7440-38-2	1.9	MG_KG	U	CLEAR	0.56	1.9	0.39	5.54	N
YS24-SB01-0.5-2-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SB02-0.5-2-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	180	UG_KG	U	CLEAR	19	180	15	NC	N
YS24-SB02P-0.5-2-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	180	UG_KG	U	CLEAR	19	180	15	NC	N
YS24-SB03-0.5-2-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SB06-0.5-2-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SB08-0.5-2-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	210	UG_KG	U	CLEAR	22	210	15	NC	N
YS24-SB121-0410-SO	SVOA	8270C	Benzo(a)pyrene	50-32-8	210	UG_KG	U	CLEAR	21	210	15	NC	N
YS24-SB07-0.5-2-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	19	190	15	NC	N
YS24-SB09-0.5-2-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	180	UG_KG	U	CLEAR	19	180	15	NC	N
YS24-SB20-7-8-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	20	200	15	NC	N
YS24-SB20B-7-8-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	340	UG_KG	U	CLEAR	35	340	15	NC	N
YS24-SB19-5-6-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SB17-5-6-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	20	200	15	NC	N
YS24-SB18-7-8-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SB16-5-6-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	190	UG_KG	U	CLEAR	20	190	15	NC	N
YS24-SB15-7-8-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	250	UG_KG	U	CLEAR	26	250	15	NC	N
YS24-SB14-10-11-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	220	UG_KG	U	CLEAR	22	220	15	NC	N
YS24-SB13-5-6-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SB12-5-6-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SB12P-5-6-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	200	UG_KG	U	CLEAR	21	200	15	NC	N
YS24-SB11-5-6-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	250	UG_KG	U	CLEAR	25	250	15	NC	N
YS24-SB10-5-6-0410	SVOA	8270C	Benzo(a)pyrene	50-32-8	230	UG_KG	U	CLEAR	23	230	15	NC	N
YS24-SB05-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SB01-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SB02-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	180	UG_KG	U	CLEAR	20	180	15	NC	N
YS24-SB02P-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	180	UG_KG	U	CLEAR	20	180	15	NC	N
YS24-SB03-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SB06-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SB08-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	210	UG_KG	U	CLEAR	23	210	15	NC	N
YS24-SB121-0410-SO	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	210	UG_KG	U	CLEAR	23	210	15	NC	N
YS24-SB07-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SB09-0.5-2-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	180	UG_KG	U	CLEAR	20	180	15	NC	N
YS24-SB20-7-8-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SB20B-7-8-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	340	UG_KG	U	CLEAR	37	340	15	NC	N
YS24-SB19-5-6-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SB17-5-6-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SB18-7-8-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SB16-5-6-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	190	UG_KG	U	CLEAR	21	190	15	NC	N
YS24-SB15-7-8-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	250	UG_KG	U	CLEAR	27	250	15	NC	N
YS24-SB14-10-11-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	220	UG_KG	U	CLEAR	24	220	15	NC	N
YS24-SB13-5-6-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SB12-5-6-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SB12P-5-6-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	200	UG_KG	U	CLEAR	22	200	15	NC	N
YS24-SB11-5-6-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	250	UG_KG	U	CLEAR	27	250	15	NC	N
YS24-SB10-5-6-0410	SVOA	8270C	Dibenz(a,h)anthracene	53-70-3	230	UG_KG	U	CLEAR	25	230	15	NC	N

TABLE 3-6

Potentially Biased Results

Sample ID	Analyte	Result	Units	RSL	ESV	Comment
YS24-SB06-0.5-2-0410	Antimony	0.66	mg/kg	3.1	NC	Result is biased low and is below the PAL. Actual result may be higher. Data is available for use by project team.
YS24-SS11P-0410	Endrin ketone	0.81	ug/kg	1800	1.95	
YS24-SS07-0410	Endrin aldehyde	0.7	ug/kg	1800	1.95	

Appendix J
Slug Test Plots



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\Yorktown, VA\MW-1\MW-01 Falling.aqt
Date: 02/08/11 Time: 19:56:23

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Project: 364428
Location: Yorktown ,VA
Test Well: MW-1
Test Date: 7/6/2010

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

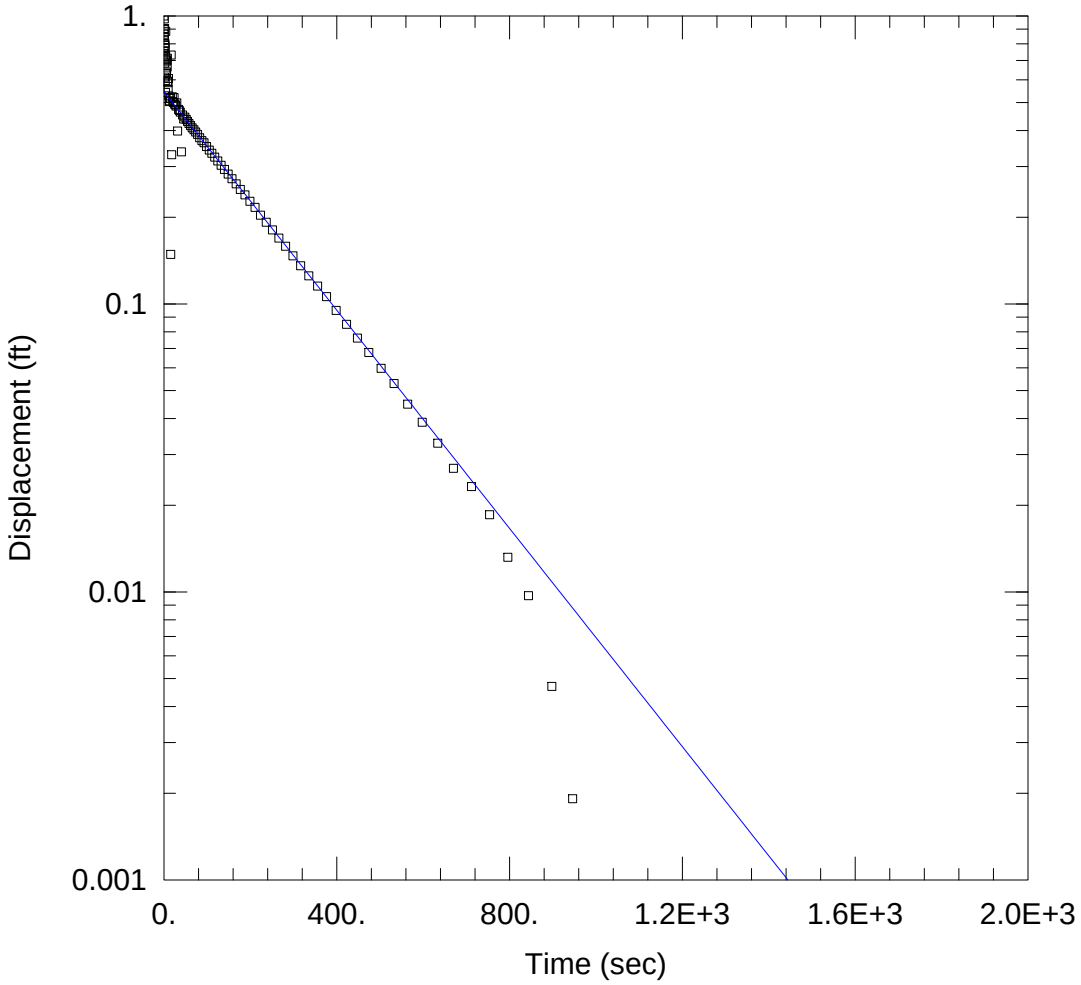
WELL DATA (MW-1)

Initial Displacement: 1. ft
Total Well Penetration Depth: 25.72 ft
Casing Radius: 0.083 ft
Static Water Column Height: 25.72 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.4177 ft/day
y0 = 0.5664 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\Yorktown, VA\MW-1\MW-01 Rising.aqt
Date: 02/08/11 Time: 19:56:44

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Project: 364428
Location: Yorktown ,VA
Test Well: MW-1
Test Date: 7/6/2010

AQUIFER DATA

Saturated Thickness: 30. ft Anisotropy Ratio (Kz/Kr): 1.

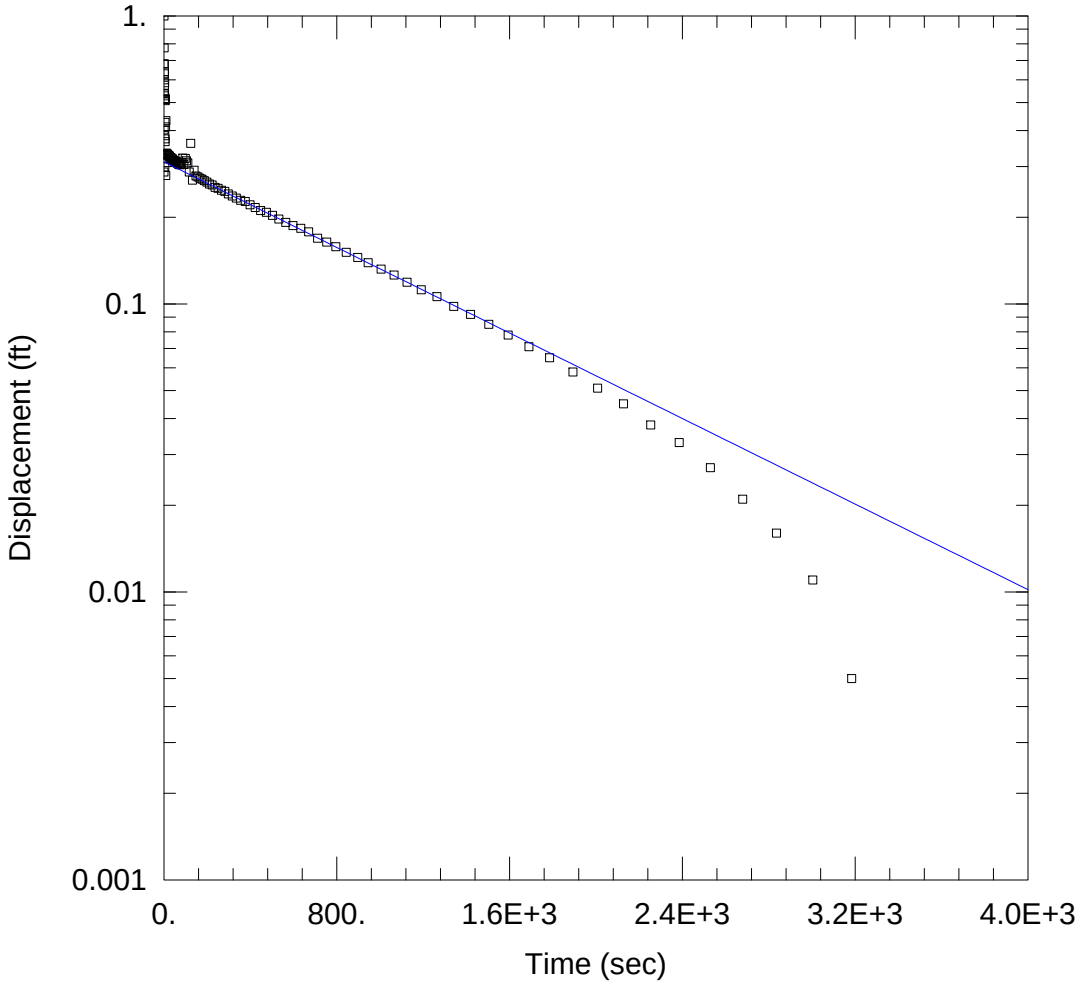
WELL DATA (MW-1)

Initial Displacement: 1. ft Static Water Column Height: 25.72 ft
Total Well Penetration Depth: 25.72 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.3839 ft/day y0 = 0.5447 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\Yorktown, VA\MW-2\MW-02 Falling.aqt
Date: 02/08/11 Time: 19:55:39

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Project: 364428
Location: Yorktown ,VA
Test Well: MW-2
Test Date: 6/18/2010

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

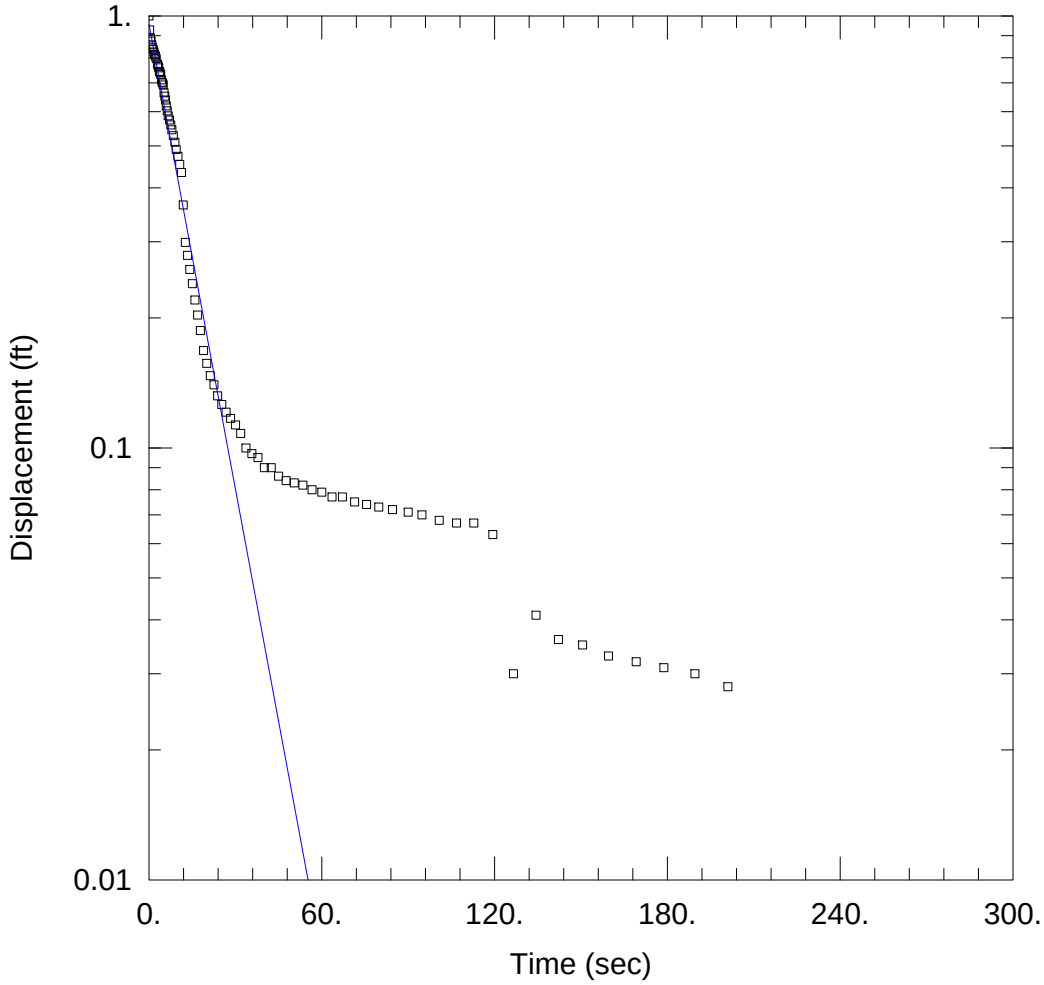
WELL DATA (MW-2)

Initial Displacement: 1. ft
Total Well Penetration Depth: 24.06 ft
Casing Radius: 0.083 ft
Static Water Column Height: 24.06 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.07368 ft/day
y0 = 0.3113 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\Yorktown, VA\MW-10\MW-10 Falling.aqt
Date: 02/08/11 Time: 19:54:57

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Project: 364428
Location: Yorktown ,VA
Test Well: MW-10
Test Date: 6/17/2010

AQUIFER DATA

Saturated Thickness: 30. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-10)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.083 ft
Static Water Column Height: 8.99 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.903 ft/day
y0 = 0.9566 ft

Appendix K
Laboratory Results

CTO-205
Yorktown - Site 24
Deep Wells
Validated Groundwater Raw Analytical Results

Station ID	YS24-GW01	YS24-GW02
Sample ID	YS24-GW01D-0610	YS24-GW02D-0610
Sample Date	06/15/10	06/15/10
Chemical Name		
Volatile Organic Compounds (µg/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
1,2,4-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	2.5 R	2.5 R
2-Hexanone	2.5 U	2.5 U
4-Methyl-2-pentanone	2.5 U	2.5 U
Acetone	1.6 B	9.2 B
Benzene	0.5 U	0.08 J
Bromodichloromethane	0.5 U	0.5 U
Bromoform	0.5 U	0.5 U
Bromomethane	0.5 U	0.5 UJ
Carbon disulfide	0.17 J	0.061 B
Carbon tetrachloride	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U
Chloroform	0.18 J	0.086 J
Chloromethane	0.5 U	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	0.057 J	0.083 J
Isopropylbenzene	0.5 U	0.5 U
m- and p-Xylene	1 U	0.13 J
Methyl acetate	0.5 U	0.5 U
Methylcyclohexane	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U
o-Xylene	0.038 J	0.06 J
Styrene	0.021 J	0.5 U
Tetrachloroethene	0.5 U	0.5 U
Toluene	0.14 B	3.7
trans-1,2-Dichloroethene	0.5 U	0.5 U
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
Xylene, total	0.038 J	0.21 J
Semivolatile Organic Compounds (µg/l)		
1,1-Biphenyl	5 U	5 U
2,2'-Oxybis(1-chloropropane)	5 U	5 U
2,4,5-Trichlorophenol	5 U	5 U
2,4,6-Trichlorophenol	5 U	5 U
2,4-Dichlorophenol	5 U	5 U
2,4-Dimethylphenol	5 U	5 U
2,4-Dinitrophenol	10 U	10 U
2,4-Dinitrotoluene	2.5 U	2.5 U
2,6-Dinitrotoluene	5 U	5 U
2-Chloronaphthalene	5 U	5 U
2-Chlorophenol	10 U	10 U
2-Methylnaphthalene	0.2 U	0.017 J
2-Methylphenol	5 U	5 U
2-Nitroaniline	10 U	10 U
2-Nitrophenol	5 U	5 U
3,3'-Dichlorobenzidine	5 U	5 U
3-Nitroaniline	10 U	10 U
4,6-Dinitro-2-methylphenol	10 U	10 U
4-Bromophenyl-phenylether	5 U	5 U
4-Chloro-3-methylphenol	5 U	5 U
4-Chloroaniline	5 U	5 U
4-Chlorophenyl-phenylether	5 U	5 U
4-Methylphenol	10 U	10 U
4-Nitroaniline	10 U	10 U
4-Nitrophenol	10 U	10 U

CTO-205
Yorktown - Site 24
Deep Wells
Validated Groundwater Raw Analytical Results

Station ID	YS24-GW01	YS24-GW02
Sample ID	YS24-GW01D-0610	YS24-GW02D-0610
Sample Date	06/15/10	06/15/10
Chemical Name		
Acenaphthene	0.2 U	0.2 U
Acenaphthylene	0.2 U	0.2 U
Acetophenone	5 U	1.2 B
Anthracene	0.2 U	0.2 U
Atrazine	5 U	5 U
Benzaldehyde	5 U	5 U
Benzo(a)anthracene	0.2 U	0.2 U
Benzo(a)pyrene	0.2 U	0.2 U
Benzo(b)fluoranthene	0.2 U	0.2 U
Benzo(g,h,i)perylene	5 U	5 U
Benzo(k)fluoranthene	0.2 U	0.2 U
bis(2-Chloroethoxy)methane	5 U	5 U
bis(2-Chloroethyl)ether	5 U	5 U
bis(2-Ethylhexyl)phthalate	34 B	1.6 J
Butylbenzylphthalate	5 U	5 U
Caprolactam	5 U	5 U
Carbazole	5 U	5 U
Chrysene	0.2 U	0.2 U
Dibenz(a,h)anthracene	5 U	5 U
Dibenzofuran	5 U	5 U
Diethylphthalate	5 U	5 U
Dimethyl phthalate	5 U	5 U
Di-n-butylphthalate	5 U	5 U
Di-n-octylphthalate	7.1	5 U
Fluoranthene	0.2 U	0.2 U
Fluorene	0.2 U	0.2 U
Hexachlorobenzene	5 U	5 U
Hexachlorobutadiene	5 U	5 U
Hexachlorocyclopentadiene	5 U	5 U
Hexachloroethane	5 U	5 U
Indeno(1,2,3-cd)pyrene	5 U	5 U
Isophorone	5 U	5 U
Naphthalene	5 U	5 U
n-Nitroso-di-n-propylamine	5 U	5 U
n-Nitrosodiphenylamine	5 U	5 U
Nitrobenzene	2.5 U	2.5 U
Pentachlorophenol	10 U	10 U
Phenanthrene	0.2 U	0.2 U
Phenol	5 U	5 U
Pyrene	0.2 U	0.2 U
Pesticide/Polychlorinated Biphenyls (µg/l)		
4,4'-DDD	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U
Aldrin	0.05 U	0.05 U
alpha-BHC	0.05 U	0.05 U
alpha-Chlordane	0.05 U	0.05 U
Aroclor-1016	0.93 U	0.93 U
Aroclor-1221	1.3 U	1.3 U
Aroclor-1232	0.93 U	0.93 U
Aroclor-1242	0.63 U	0.63 U
Aroclor-1248	0.63 U	0.63 U
Aroclor-1254	0.63 U	0.63 U
Aroclor-1260	0.93 U	0.93 U
beta-BHC	0.018 B	0.018 J
delta-BHC	0.05 U	0.05 U
Dieldrin	0.1 U	0.1 U
Endosulfan I	0.05 U	0.084 J
Endosulfan II	0.1 U	0.1 U
Endosulfan sulfate	0.1 U	0.1 U
Endrin	0.1 U	0.1 U
Endrin aldehyde	0.1 UL	0.1 UL
Endrin ketone	0.1 U	0.1 U
gamma-BHC (Lindane)	0.05 U	0.05 U
gamma-Chlordane	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.0098 J
Methoxychlor	0.5 U	0.5 U
Toxaphene	2.5 U	2.5 U
Explosives (µg/l)		
1,3,5-Trinitrobenzene	2.5 U	2.5 U
1,3-Dinitrobenzene	2.5 U	2.5 U
2,4,6-Trinitrotoluene	2.5 U	2.5 U
2-Amino-4,6-dinitrotoluene	5 U	5 U
2-Nitrotoluene	5 U	5 U
3-Nitrotoluene	5 U	5 U
4-Amino-2,6-dinitrotoluene	5 U	5 U

CTO-205
Yorktown - Site 24
Deep Wells
Validated Groundwater Raw Analytical Results

Station ID	YS24-GW01	YS24-GW02
Sample ID	YS24-GW01D-0610	YS24-GW02D-0610
Sample Date	06/15/10	06/15/10
Chemical Name		
4-Nitrotoluene	5 U	5 U
HMX	2.5 UL	2.5 UL
RDX	4 U	4 U
Tetryl	5 U	5 U
Total Metals (µg/l)		
Aluminum	234 B	135 B
Antimony	7.4 B	7.5 B
Arsenic	10 U	10 U
Barium	35.1 J	28.9 J
Beryllium	5 U	5 U
Cadmium	5 U	5 U
Calcium	75,200	25,300
Chromium	1.1 B	10 U
Cobalt	5 U	5 U
Copper	4.4 B	1.3 B
Cyanide	10 U	10 U
Iron	541	238
Lead	3 U	1.7 B
Magnesium	2,530 J	1,510 J
Manganese	113	18.4
Mercury	0.2 U	0.2 U
Nickel	1.4 B	0.83 B
Potassium	9,900	27,600
Selenium	5 U	3 B
Silver	5 U	5 U
Sodium	37,200	90,100
Thallium	10 U	10 U
Vanadium	20 U	4.5 J
Zinc	20 U	4.3 J
Dissolved Metals (µg/l)		
Aluminum, Dissolved	71.3 B	96.8 B
Antimony, Dissolved	10.3 B	6.2 B
Arsenic, Dissolved	3.6 B	5.7 B
Barium, Dissolved	33.1 J	21.5 J
Beryllium, Dissolved	5 U	5 U
Cadmium, Dissolved	5 U	5 U
Calcium, Dissolved	75,800	16,100
Chromium, Dissolved	1.3 B	0.85 B
Cobalt, Dissolved	5 U	5 U
Copper, Dissolved	2.9 J	5 U
Iron, Dissolved	71 B	55.5 B
Lead, Dissolved	1.8 B	3 U
Magnesium, Dissolved	2,530 J	1,570 J
Manganese, Dissolved	110	3.8 B
Mercury, Dissolved	0.2 U	0.2 U
Nickel, Dissolved	0.95 B	5 U
Potassium, Dissolved	7,990	27,600
Selenium, Dissolved	5 U	5 U
Silver, Dissolved	5 U	5 U
Sodium, Dissolved	35,000	93,900
Thallium, Dissolved	10 U	10 U
Vanadium, Dissolved	20 U	4.1 J
Zinc, Dissolved	6.4 B	4.9 B

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
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
µg/l - Micrograms per liter

CTO-205
Yorktown - Site 24
Drainage Swales
Validated Surface Soil Raw Analytical Results

Station ID	24SS02	24SS03		24SS04	YS24-SS22	YS24-SS23	YS24-SS24	YS24-SS25	YS24-SS26		YS24-SS27	YS24-SS28	YS24-SS29	YS24-SS30	YS24-SS31
Sample ID	24SS02	24SS03	24SS03D	24SS04	YS24-SS22-0410	YS24-SS23-0410	YS24-SS24-0410	YS24-SS25-0410	YS24-SS26-0410	YS24-SS26P-0410	YS24-SS27-0410	YS24-SS28-0410	YS24-SS29-0410	YS24-SS30-0410	YS24-SS31-0410
Sample Date	09/09/97	09/09/97	09/09/97	09/09/97	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10
Chemical Name															
Volatile Organic Compounds (µg/kg)															
1,1,1-Trichloroethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,1,2,2-Tetrachloroethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,1,2-Trichloroethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,1-Dichloroethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,1-Dichloroethene	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,2,4-Trichlorobenzene	340 U	360 U	360 U	370 U	0.13 B	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 UJ
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 UJ
1,2-Dibromoethane	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,2-Dichlorobenzene	340 U	360 U	360 U	370 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 UJ
1,2-Dichloroethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,2-Dichloroethene (total)	10 U	11 U	11 U	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,3-Dichlorobenzene	340 U	360 U	360 U	370 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
1,4-Dichlorobenzene	340 U	360 U	360 U	370 U	0.094 B	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 UJ
2-Butanone	10 U	11 U	11 U	11 U	3.7 U	16 K	2.5 B	4.4 B	8.9 J	7.2 J	3.2 B	4.6 B	9.6 B	8.8 K	8.1 K
2-Hexanone	10 U	11 U	11 U	11 U	3.7 U	6.3 U	3.8 U	4.9 U	5.9 UJ	7.2 U	3.8 U	4.4 U	7.3 U	6.3 U	5.5 U
4-Methyl-2-pentanone	10 U	11 U	11 U	11 U	3.7 U	6.3 U	3.8 U	4.9 U	5.9 UJ	7.2 U	3.8 U	4.4 U	7.3 U	6.3 U	5.5 U
Acetone	10 U	11 U	11 U	11 U	13 B	180 B	52 B	170 B	190 B	110 B	71 B	100 B	210 B	120 B	100 B
Benzene	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Bromodichloromethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Bromoform	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Bromomethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Carbon disulfide	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Carbon tetrachloride	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Chlorobenzene	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Chloroethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Chloroform	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Chloromethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
cis-1,3-Dichloropropene	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Cyclohexane	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Dibromochloromethane	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Ethylbenzene	10 U	11 U	11 U	11 U	1.5 U	0.3 B	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Isopropylbenzene	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
m- and p-Xylene	NA	NA	NA	NA	2.9 U	5 U	3 U	3.9 U	4.7 UJ	5.8 U	3.1 U	3.5 U	5.8 U	5.1 U	4.4 U
Methyl acetate	NA	NA	NA	NA	4.8 J	2.5 U	17 J	10 J	220 J	24 J	42 J	37 J	560 J	25 K	120 J
Methylcyclohexane	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Methylene chloride	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	0.16 B	1.8 U	2.9 U	2.5 U	2.2 U
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
o-Xylene	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Styrene	10 U	11 U	11 U	11 U	0.04 J	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Tetrachloroethene	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Toluene	10 U	0.8 J	11 U	6 J	0.18 B	0.39 B	0.26 B	0.34 B	0.53 B	0.5 B	0.22 B	0.38 B	0.44 B	2.5 U	0.22 B
trans-1,2-Dichloroethene	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
trans-1,3-Dichloropropene	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Trichloroethene	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Trichlorofluoromethane(Freon-11)	NA	NA	NA	NA	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Vinyl chloride	10 U	11 U	11 U	11 U	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Xylene, total	10 U	1 J	2 B	2 B	1.5 U	2.5 U	1.5 U	2 U	2.3 UJ	2.9 U	1.5 U	1.8 U	2.9 U	2.5 U	2.2 U
Semivolatile Organic Compounds (µg/kg)															
1,1-Biphenyl	NA	NA	NA	NA	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
2,2'-Oxybis(1-chloropropane)	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
2,4,5-Trichlorophenol	830 U	870 U	870 U	900 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
2,4,6-Trichlorophenol	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
2,4-Dichlorophenol	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
2,4-Dimethylphenol	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U

CTO-205
Yorktown - Site 24
Drainage Swales
Validated Surface Soil Raw Analytical Results

Station ID	24SS02	24SS03		24SS04	YS24-SS22	YS24-SS23	YS24-SS24	YS24-SS25	YS24-SS26		YS24-SS27	YS24-SS28	YS24-SS29	YS24-SS30	YS24-SS31
Sample ID	24SS02	24SS03	24SS03D	24SS04	YS24-SS22-0410	YS24-SS23-0410	YS24-SS24-0410	YS24-SS25-0410	YS24-SS26-0410	YS24-SS26P-0410	YS24-SS27-0410	YS24-SS28-0410	YS24-SS29-0410	YS24-SS30-0410	YS24-SS31-0410
Sample Date	09/09/97	09/09/97	09/09/97	09/09/97	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10
Chemical Name															
2,4-Dinitrophenol	830 UJ	870 UJ	870 UJ	900 UJ	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
2,4-Dinitrotoluene	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
2-Chlorophenol	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
2-Methylnaphthalene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
2-Methylphenol	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
2-Nitroaniline	830 U	870 U	870 U	900 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
2-Nitrophenol	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
3,3'-Dichlorobenzidine	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
3-Nitroaniline	830 U	870 U	870 U	900 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
4,6-Dinitro-2-methylphenol	830 U	870 U	870 U	900 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
4-Bromophenyl-phenylether	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
4-Chloro-3-methylphenol	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
4-Chloroaniline	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
4-Chlorophenyl-phenylether	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
4-Methylphenol	340 U	360 U	360 U	370 U	290 U	330 U	280 U	270 U	280 U	270 U	270 U	280 U	290 U	280 U	280 U
4-Nitroaniline	830 U	870 U	870 U	900 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
4-Nitrophenol	830 U	870 U	870 U	900 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
Acenaphthene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Acenaphthylene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	26 J
Acetophenone	NA	NA	NA	NA	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Anthracene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	35 J
Atrazine	NA	NA	NA	NA	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Benzaldehyde	NA	NA	NA	NA	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Benzo(a)anthracene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	44 J	190 U	32 J	180 U	190 U	200 U	190 U	160 J
Benzo(a)pyrene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	52 J	20 J	28 J	180 U	190 U	200 U	190 U	180 J
Benzo(b)fluoranthene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	91 J	21 J	33 J	180 U	190 U	200 U	190 U	250
Benzo(g,h,i)perylene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	22 J	190 U	190 U	180 U	190 U	200 U	190 U	130 J
Benzo(k)fluoranthene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	92 J	29 J	33 J	180 U	190 U	200 U	190 U	300
bis(2-Chloroethoxy)methane	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
bis(2-Chloroethyl)ether	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	340 U	360 U	360 U	370 U	140 J	220 U	50 J	180 U	190 U	43 J	41 J	110 J	320	190 U	140 J
Butylbenzylphthalate	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Caprolactam	NA	NA	NA	NA	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Carbazole	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Chrysene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	81 J	30 J	39 J	180 U	190 U	200 U	190 U	260
Dibenz(a,h)anthracene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	45 J
Dibenzofuran	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Diethylphthalate	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Dimethyl phthalate	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Di-n-butylphthalate	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Di-n-octylphthalate	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Fluoranthene	340 U	360 U	360 U	370 U	200 U	57 J	38 J	94 J	59 J	65 J	180 U	190 U	200 U	190 U	250
Fluorene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Hexachlorobenzene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Hexachlorobutadiene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Hexachlorocyclopentadiene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Hexachloroethane	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Indeno(1,2,3-cd)pyrene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	150 J
Isophorone	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Naphthalene	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
n-Nitroso-di-n-propylamine	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
n-Nitrosodiphenylamine	340 U	360 U	360 U	370 U	200 U	220 U	190 U	180 U	190 U	190 U	180 U	190 U	200 U	190 U	190 U
Nitrobenzene	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Pentachlorophenol	830 U	870 U	870 U	900 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
Phenanthrene	340 U	360 U	360 U	370 U	28 J	61 J	42 J	40 J	63 J	49 J	26 J	190 U	200 U	190 U	44 J
Phenol	340 U	360 U	360 U	370 U	380 U	430 U	370 U	350 U	370 U	360 U	350 U	380 U	380 U	370 U	370 U
Pyrene	340 U	360 U	360 U	370 U	200 U	47 J	31 J	96 J	53 J	62 J	180 U	190 U	200 U	190 U	330

CTO-205
Yorktown - Site 24
Drainage Swales
Validated Surface Soil Raw Analytical Results

Station ID	24SS02	24SS03		24SS04	YS24-SS22	YS24-SS23	YS24-SS24	YS24-SS25	YS24-SS26		YS24-SS27	YS24-SS28	YS24-SS29	YS24-SS30	YS24-SS31
Sample ID	24SS02	24SS03	24SS03D	24SS04	YS24-SS22-0410	YS24-SS23-0410	YS24-SS24-0410	YS24-SS25-0410	YS24-SS26-0410	YS24-SS26P-0410	YS24-SS27-0410	YS24-SS28-0410	YS24-SS29-0410	YS24-SS30-0410	YS24-SS31-0410
Sample Date	09/09/97	09/09/97	09/09/97	09/09/97	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10
Chemical Name															
Pesticide/Polychlorinated Biphenyls (µg/kg)															
4,4'-DDD	3.4 U	3.6 U	3.6 U	3.8 U	1.4 J	4.3 UJ	3.7 UJ	3.5 UJ	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
4,4'-DDE	3.4 U	0.26 J	0.26 J	3.8 U	0.53 J	4.3 UJ	3.7 UJ	0.72 J	0.39 J	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	0.66 J	0.59 J
4,4'-DDT	0.75 B	1.1 B	0.88 B	0.75 B	3.8 UJ	4.3 UJ	3.7 UJ	3.5 UJ	3.7 UJ	0.62 J	3.5 UJ	3.8 UJ	3.8 UJ	2.1 J	0.64 J
Aldrin	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	0.26 J	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	1.9 UJ
alpha-BHC	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	1.8 UJ	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	0.5 J
alpha-Chlordane	1.7 U	0.42 J	0.3 J	1.9 U	0.99 J	2.2 UJ	1.9 UJ	0.31 J	1 J	0.64 J	1.8 UJ	0.29 J	0.26 J	1.9 UJ	1.9 UJ
Aroclor-1016	34 U	36 U	36 U	38 U	28 UJ	32 UJ	27 UJ	26 UJ	27 UJ	26 UJ	26 UJ	27 UJ	28 UJ	27 UJ	27 UJ
Aroclor-1221	69 U	72 U	73 U	75 U	39 UJ	45 UJ	38 UJ	37 UJ	38 UJ	37 UJ	37 UJ	39 UJ	40 UJ	38 UJ	38 UJ
Aroclor-1232	34 U	36 U	36 U	38 U	20 UJ	22 UJ	19 UJ	18 UJ	19 UJ	19 UJ	18 UJ	19 UJ	20 UJ	19 UJ	19 UJ
Aroclor-1242	34 U	36 U	36 U	38 U	20 UJ	22 UJ	19 UJ	18 UJ	19 UJ	19 UJ	18 UJ	19 UJ	20 UJ	19 UJ	19 UJ
Aroclor-1248	34 U	36 U	36 U	38 U	20 UJ	22 UJ	19 UJ	18 UJ	19 UJ	19 UJ	18 UJ	19 UJ	20 UJ	19 UJ	19 UJ
Aroclor-1254	34 U	36 U	36 U	38 U	20 UJ	22 UJ	19 UJ	18 UJ	19 UJ	19 UJ	18 UJ	19 UJ	20 UJ	19 UJ	19 UJ
Aroclor-1260	34 U	36 U	36 U	38 U	20 UJ	22 UJ	19 UJ	18 UJ	19 UJ	19 UJ	18 UJ	19 UJ	20 UJ	19 UJ	19 UJ
beta-BHC	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	1.8 UJ	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	0.79 J
delta-BHC	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	0.97 J	0.2 J	0.18 J	0.19 J	0.27 J	2 UJ	1.9 UJ	1.9 UJ
Dieldrin	3.4 U	0.26 J	0.24 J	0.23 J	3.8 UJ	4.3 UJ	3.7 UJ	3.5 UJ	0.44 J	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
Endosulfan I	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	0.61 J	1.9 UJ	1.9 UJ	1.8 UJ	0.26 J	2 UJ	1.9 UJ	0.33 J
Endosulfan II	3.4 U	3.6 U	3.6 U	3.8 U	3.8 UJ	4.3 UJ	3.7 UJ	3.5 UJ	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	0.42 J
Endosulfan sulfate	3.4 U	3.6 U	3.6 U	3.8 U	3.8 UJ	4.3 UJ	3.7 UJ	3.5 UJ	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
Endrin	3.4 U	3.6 U	3.6 U	3.8 U	3.8 UJ	4.3 UJ	3.7 UJ	0.56 J	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
Endrin aldehyde	3.4 U	3.6 U	3.6 U	3.8 U	0.52 J	4.3 UJ	3.7 UJ	0.52 J	0.38 J	0.48 J	3.5 UJ	3.8 UJ	0.41 J	3.7 UJ	1.2 J
Endrin ketone	3.4 U	3.6 U	3.6 U	3.8 U	3.8 UJ	4.3 UJ	3.7 UJ	0.61 J	3.7 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.8 UJ	3.7 UJ	3.7 UJ
gamma-BHC (Lindane)	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	1.8 UJ	0.3 J	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	0.37 J	0.81 J
gamma-Chlordane	1.7 U	0.36 J	0.27 J	1.9 U	1.1 J	2.2 UJ	1.9 UJ	0.25 J	0.6 J	0.76 J	1.8 UJ	0.28 J	2 UJ	0.3 J	1.3 J
Heptachlor	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	0.2 J	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	0.26 J
Heptachlor epoxide	1.7 U	1.8 U	1.8 U	1.9 U	2 UJ	2.2 UJ	1.9 UJ	1.8 UJ	1.9 UJ	1.9 UJ	1.8 UJ	1.9 UJ	2 UJ	1.9 UJ	1.9 UJ
Methoxychlor	1.2 B	1.7 B	1.1 B	1.9 B	20 UJ	22 UJ	19 UJ	18 UJ	19 UJ	19 UJ	18 UJ	19 UJ	20 UJ	19 UJ	19 UJ
Toxaphene	170 U	180 U	180 U	190 U	95 UJ	110 UJ	92 UJ	89 UJ	92 UJ	91 UJ	89 UJ	94 UJ	97 UJ	92 UJ	93 UJ
Explosives (µg/kg)															
1,3,5-Trinitrobenzene	250 U	250 U	250 U	250 U	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL
1,3-Dinitrobenzene	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,4,6-Trinitrotoluene	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Amino-4,6-dinitrotoluene	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Nitrotoluene	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
3-Nitrotoluene	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
4-Amino-2,6-dinitrotoluene	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
4-Nitrotoluene	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
HMX	500 U	500 U	500 U	500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
RDX	500 U	500 U	500 U	500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Tetryl	650 U	650 U	650 U	650 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
Total Metals (mg/kg)															
Aluminum	3,130 J	6,200 J	6,770 J	8,870 J	9,340	6,470	5,530	4,640	4,820	4,860	4,440	11,900	10,100	5,430	5,390
Antimony	0.79 UL	0.82 UL	0.83 UL	0.85 UL	0.49 J	1.3 U	1.1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.69 J
Arsenic	1.8 J	2.9	2.6	9.1	3.4	2.8	1.2 B	1 U	1.1 U	1.1 U	0.32 B	0.74 B	2.1	0.46 B	151
Barium	13.6 J	34.8 J	36 J	27 J	30	23.6 J	15.3 J	20.2 J	30.9	30.1	20.2 J	34.5	47.3	31.3	34.4
Beryllium	0.04 U	0.11 J	0.11 J	0.16 J	0.26 J	0.35 J	0.17 B	0.14 B	0.23 J	0.21 B	0.21 B	0.29 J	0.27 J	0.27 J	0.49 J
Cadmium	0.06 B	0.33 J	0.37 J	0.15 B	0.59	0.61 J	0.22 J	0.1 J	0.71	0.76	0.58	0.42 J	0.39 J	0.31 J	0.19 J
Calcium	357 J	1,600 J	1,150 J	1,070 J	877	75,500	493 J	284 J	549	621	122 J	706	924	1,090	432 J
Chromium	7.3 J	10.9 J	10.9 J	24.6 J	17.2	12.7	8	4.7	4.8	5	5	12.5	10.5	5.8	5.3
Cobalt	0.62 J	1.7 J	1.8 J	1.6 J	1.1	1.7	0.51 J	0.38 J	1.4	1.4	0.88	2.1	5.1	1.8	9
Copper	2.7 J	4.5 J	4.6 J	5.7	5.6	4.3	1.5	1.2	3.5	4.7	3.3	2.3	1.5	3.6	2.7
Cyanide	2.1 UL	0.18 L	0.17 L	2.2 UL	0.58 U	0.64 U	0.55 U	0.52 U	0.54 U	0.53 U	0.2 J	0.57 U	0.56 U	0.54 U	0.56 U
Iron	4,760	6,050	5,840	15,100	9,330	8,140	4,420	2,700	2,790	2,850	2,810	6,610	5,990	4,230	3,040
Lead	5.5 L	11	11.6	9.2	8.6	10.6	5.2	5	9	9.4	7	7.4	7	11.2	6.2
Magnesium	222 J	503 J	568 J	1,010 J	725	1,340	413 J	301 J	332 J	335 J	226 J	603	563 J	342 J	387 J
Manganese	27.6 K	98.7	103	25.7 K	23	93.5	16.9	12.5	67.5	66.4	32.9	15.1	55	77	113
Mercury	0.05 U	0.1 J	0.1 J	0.07 J	0.54	0.031 J	0.038	0.018 J	0.029 J	0.026 J	0.021 J	0.037 U	0.038 U	0.04	0.018 J
Nickel	1.7 J	3.7 J	3.6 J	3.3 J	2.5	3.8	1.3	1.2	2.5	2.6	2	4.3	5.8	3.3	6.5

CTO-205
Yorktown - Site 24
Drainage Swales
Validated Surface Soil Raw Analytical Results

Station ID	24SS02	24SS03		24SS04	YS24-SS22	YS24-SS23	YS24-SS24	YS24-SS25	YS24-SS26		YS24-SS27	YS24-SS28	YS24-SS29	YS24-SS30	YS24-SS31
Sample ID	24SS02	24SS03	24SS03D	24SS04	YS24-SS22-0410	YS24-SS23-0410	YS24-SS24-0410	YS24-SS25-0410	YS24-SS26-0410	YS24-SS26P-0410	YS24-SS27-0410	YS24-SS28-0410	YS24-SS29-0410	YS24-SS30-0410	YS24-SS31-0410
Sample Date	09/09/97	09/09/97	09/09/97	09/09/97	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10	04/14/10
Chemical Name															
Potassium	220 J	431 J	498 J	868 J	834	1,240	598	231 J	285 J	282 J	221 J	483 J	480 J	331 J	302 J
Selenium	0.85 U	0.89 U	0.89 U	0.92 U	0.58 U	0.64 U	0.55 U	0.52 U	0.54 U	0.53 U	0.54 U	0.57 U	0.57 U	0.54 U	0.55 U
Silver	0.21 U	0.22 U	0.22 U	0.22 U	0.35 J	0.64 U	0.55 U	0.52 U	0.54 U	0.53 U	0.54 U	0.57 U	0.57 U	0.54 U	0.55 U
Sodium	45.9 U	48.1 U	48.2 U	49.9 U	90.9 J	315 J	91.5 J	85.7 J	85.6 J	92.6 J	73 J	87.7 J	91.7 J	78 J	79.8 J
Thallium	1.2 U	1.3 U	1.3 U	1.3 U	1.2 U	1.3 U	1.1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Vanadium	12.6	21.8	22.8	28.9	20.8	15.7	11.1	7.8	7.7	7.8	6.5	18.5	16.8	10.1	6.8
Zinc	14.1 K	39.4 K	41.4	21 K	13.8	16.9	6.2	5.9	21.9	24.2	17.8	15.4	25.5	14.5	15.7
Wet Chemistry															
Cation Exchange Capacity (MEQ/100G) (mg/kg)	4,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	5.3	NA	NA	NA	5.55	8.2	6.13	5.08	6.55	NA	5.44	5.76	7.19	7.72	5.97
Total organic carbon (TOC) (mg/kg)	4,700	NA	NA	NA	3,909	20,740	4,796	6,708	16,160	NA	8,456	14,200	5,448	12,920	9,767
Geotechnical (g/cc)															
Density	1.48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size (pct/p)															
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	99.8	80.6	99	99	95.8	NA	99.3	100	100	98	99.1
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	89.6	63.3	90.1	92.9	87.3	NA	96.9	95.2	99.4	94.8	97.3
Sieve No. 020 (850 um)	NA	NA	NA	NA	72.5	45.4	80.4	83.2	78	NA	81.6	80.1	80.7	85.5	91.3
Sieve No. 040 (425 um)	NA	NA	NA	NA	56.4	29.8	70.9	66.5	60.8	NA	59.5	64.3	64.8	71.2	78.9
Sieve No. 060 (250 um)	NA	NA	NA	NA	32.3	16.5	43	39.1	29.1	NA	32.5	34.7	37.9	41.6	40.7
Sieve No. 080 (180 um)	NA	NA	NA	NA	15	9	13.8	18.5	15.4	NA	15.2	13.1	17	18.3	16.8
Sieve No. 100 (150 um)	NA	NA	NA	NA	12	7.4	9.4	13.9	12.5	NA	11.4	10.3	13.3	14.5	13.2
Sieve No. 230 (63-UM)	NA	NA	NA	NA	1.5	1	1.8	2.3	1.9	NA	1.3	1.8	2	3.7	2.2
Sieve No. 200 (75 um)	NA	NA	NA	NA	2.3	1.5	2.3	3.3	2.5	NA	1.9	2.4	3.1	4.6	3.2

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in associated 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

NA - Not analyzed

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

g/cc - Grams per cubic centimeter

mg/kg - Milligrams per kilogram

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

CLEAN 8012 CTO-WE74
WPNSTA Yorktown
Site 24 Groundwater
Analytical Results

Station ID	YS24-GW/SB09	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-GW03		YS24-GW10	YS24-GW11	
Sample ID	YS24-GW09S-0610	YS24-GW04S-0610	YS24-GW05S-0610	YS24-GW06S-0610	YS24-GW07S-0610	YS24-GW08S-0610	YS24-GW03S-0610	YS24-GW03SP-0610	YS24-GW10S-0610	YS24-GW11-0713	YS24-GW11P-0713
Sample Date	06/15/10	06/16/10	06/16/10	06/16/10	06/16/10	06/15/10	06/16/10	06/16/10	06/16/10	07/08/13	07/08/13
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U
1,2-Dibromoethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	2.5 R	2.5 R	2.5 R	2.5 R	2.5 R	2.5 R	2.5 R	2.5 R	2.5 R	5 U	5 U
2-Hexanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	0.56 B	2.5 U	2.5 U	2.5 U	2.5 U	3.9 B	2.5 U	0.7 B	1.6 B	5 U	5 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	1 U	1 U
Carbon disulfide	0.12 B	0.2 J	0.5 U	0.5 U	0.031 J	0.097 B	0.5 U	0.5 U	0.045 J	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U
Chloroform	0.5 U	0.5 U	0.5 U	0.087 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m- and p-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA
Methyl acetate	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
o-Xylene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA
Styrene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.11 B	0.15 B	0.093 B	0.13 B	0.069 B	0.17 B	0.066 B	0.069 B	0.12 B	0.5 U	0.5 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1	1	0.5 U	1 U	1 U
Vinyl chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylene, total	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	1.5 U
Semivolatile Organic Compounds (µg/l)											
1,1-Biphenyl	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
2,2'-Oxybis(1-chloropropane)	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
2,4,5-Trichlorophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
2,4,6-Trichlorophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
2,4-Dichlorophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
2,4-Dimethylphenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	9.62 U	9.62 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	24 U	24 U

CLEAN 8012 CTO-WE74
WPNSTA Yorktown
Site 24 Groundwater
Analytical Results

Station ID	YS24-GW/SB09	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-GW03		YS24-GW10	YS24-GW11	
Sample ID	YS24-GW09S-0610	YS24-GW04S-0610	YS24-GW05S-0610	YS24-GW06S-0610	YS24-GW07S-0610	YS24-GW08S-0610	YS24-GW03S-0610	YS24-GW03SP-0610	YS24-GW10S-0610	YS24-GW11-0713	YS24-GW11P-0713
Sample Date	06/15/10	06/16/10	06/16/10	06/16/10	06/16/10	06/15/10	06/16/10	06/16/10	06/16/10	07/08/13	07/08/13
Chemical Name											
2,4-Dinitrotoluene	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.151 U	0.151 U
2,6-Dinitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.653 J	0.193 J
2-Chloronaphthalene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.4 U	2.4 U
2-Methylnaphthalene	0.2 U	0.2 U	5 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0962 U
2-Methylphenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
2-Nitroaniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.62 U	9.62 U
2-Nitrophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
3,3'-Dichlorobenzidine	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
3-Nitroaniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.62 U	9.62 U
4,6-Dinitro-2-methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.62 U	9.62 U
4-Bromophenyl-phenylether	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
4-Chloro-3-methylphenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
4-Chloroaniline	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
4-Chlorophenyl-phenylether	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.4 U	2.4 U
4-Nitroaniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.62 U	9.62 U
4-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.62 U	9.62 U
Acenaphthene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0962 U
Acenaphthylene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0962 U
Acetophenone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Anthracene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0962 U
Atrazine	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Benzaldehyde	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Benzo(a)anthracene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0962 U
Benzo(a)pyrene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0962 U
Benzo(b)fluoranthene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0637 J
Benzo(g,h,i)perylene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.0962 U	0.0602 J
Benzo(k)fluoranthene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0521 J
bis(2-Chloroethoxy)methane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
bis(2-Chloroethyl)ether	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
bis(2-Ethylhexyl)phthalate	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Butylbenzylphthalate	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Caprolactam	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Carbazole	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Chrysene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0629 J
Dibenz(a,h)anthracene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.0962 U	0.0962 U
Dibenzofuran	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Diethylphthalate	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Dimethyl phthalate	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Di-n-butylphthalate	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Di-n-octylphthalate	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Fluoranthene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0838 J
Fluorene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0962 U
Hexachlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Hexachlorobutadiene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 UJ	2.4 UJ
Hexachlorocyclopentadiene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	4.81 U	4.81 U
Hexachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Indeno(1,2,3-cd)pyrene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.0962 U	0.0608 J
Isophorone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Naphthalene	0.2 U	0.2 U	5 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0962 U
n-Nitroso-di-n-propylamine	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
n-Nitrosodiphenylamine	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Nitrobenzene	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.902 J	0.955
Pentachlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.62 U	9.62 U
Phenanthrene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.192 U	0.0995 J
Phenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.4 U	2.4 U
Pyrene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.0962 U	0.0767 J

CLEAN 8012 CTO-WE74
WPNSTA Yorktown
Site 24 Groundwater
Analytical Results

Station ID	YS24-GW/SB09	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-GW03		YS24-GW10	YS24-GW11	
Sample ID	YS24-GW09S-0610	YS24-GW04S-0610	YS24-GW05S-0610	YS24-GW06S-0610	YS24-GW07S-0610	YS24-GW08S-0610	YS24-GW03S-0610	YS24-GW03SP-0610	YS24-GW10S-0610	YS24-GW11-0713	YS24-GW11P-0713
Sample Date	06/15/10	06/16/10	06/16/10	06/16/10	06/16/10	06/15/10	06/16/10	06/16/10	06/16/10	07/08/13	07/08/13
Chemical Name											
Pesticide/Polychlorinated Biphenyls (µg/l)											
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.00943 U	0.00943 U
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.00943 U	0.00943 U
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.00943 U	0.00943 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.00943 U	0.00943 U
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.00943 U	0.00492 J
alpha-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.00943 U	0.00943 U
Aroclor-1016	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.236 U	0.236 U
Aroclor-1221	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	0.236 U	0.236 U
Aroclor-1232	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.236 U	0.236 U
Aroclor-1242	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.236 U	0.236 U
Aroclor-1248	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.236 U	0.236 U
Aroclor-1254	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.236 U	0.236 U
Aroclor-1260	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U	0.236 U	0.236 U
beta-BHC	0.05 U	0.028 B	0.05 U	0.05 U	0.026 B	0.05 U	0.043 B	0.032 B	0.02 B	0.0451 J	0.0438 J
delta-BHC	0.05 U	0.018 B	0.034 B	0.0066 B	0.0051 B	0.05 U	0.05 U	0.05 U	0.011 B	0.00943 U	0.00943 U
Dieldrin	0.1 U	0.1 U	0.1 U	0.0038 J	0.1 U	0.1 U	0.1 U	0.1 U	0.0041 J	0.00943 U	0.00943 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.026 J	0.05 U	0.05 U	0.05 U	0.05 U	0.0056 J	0.00505 J	0.00943 U
Endosulfan II	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.0046 J	0.00943 U	0.00943 U
Endosulfan sulfate	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.00943 U	0.00943 U
Endrin	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.0057 J	0.1 U	0.0066 J	0.00943 U	0.00943 U
Endrin aldehyde	0.1 UL	0.018 B	0.0063 B	0.0057 B	0.03 B	0.1 UL	0.028 B	0.0087 B	0.01 B	0.00943 U	0.00943 U
Endrin ketone	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.00943 U	0.00943 U
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.0284 J	0.0233 J
gamma-Chlordane	0.05 U	0.05 U	0.05 U	0.0061 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.00943 U	0.00943 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.019 J	0.0167 J
Heptachlor epoxide	0.05 U	0.028 J	0.05 U	0.05 U	0.05 U	0.006 J	0.05 U	0.05 U	0.0067 J	0.00943 U	0.00943 U
Methoxychlor	0.5 U	0.5 U	0.5 U	0.036 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.00943 U	0.00943 U
Toxaphene	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.629 U	0.629 U
Explosives (µg/l)											
1,3,5-Trinitrobenzene	2.5 U	2.5 U	2.5 U	1.18 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1.46	1.47
1,3-Dinitrobenzene	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.0962 J	0.0939 J
2,4,6-Trinitrotoluene	2.5 U	2.5 U	1.32 J	1.66 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.23	2.25
2-Amino-4,6-dinitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1.9	1.89
2-Nitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.151 U	0.151 U
3-Nitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.151 U	0.151 U
4-Amino-2,6-dinitrotoluene	5 U	5 U	5 U	0.782 J	5 U	5 U	5 U	5 U	5 U	2.36	2.32
4-Nitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.151 U	0.151 U
HMX	2.5 UL	2.5 UL	2.5 UL	2.5 UL	2.5 UL	2.5 UL	2.5 UL	2.5 UL	2.5 UL	0.151 U	0.151 U
RDX	4 U	4 U	1.78 J	4 U	4 U	4 U	4 U	4 U	4 U	0.151 U	0.151 U
Tetryl	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.151 U	0.151 U

CLEAN 8012 CTO-WE74
WPNSTA Yorktown
Site 24 Groundwater
Analytical Results

Station ID	YS24-GW/SB09	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-GW03		YS24-GW10	YS24-GW11	
Sample ID	YS24-GW09S-0610	YS24-GW04S-0610	YS24-GW05S-0610	YS24-GW06S-0610	YS24-GW07S-0610	YS24-GW08S-0610	YS24-GW03S-0610	YS24-GW03SP-0610	YS24-GW10S-0610	YS24-GW11-0713	YS24-GW11P-0713
Sample Date	06/15/10	06/16/10	06/16/10	06/16/10	06/16/10	06/15/10	06/16/10	06/16/10	06/16/10	07/08/13	07/08/13
Chemical Name											
Total Metals (µg/l)											
Aluminum	70.1 B	52.4 B	64.1 B	37.9 B	62 B	69.7 B	47.7 B	43.5 B	77.8 B	18.2 J	25 UJ
Antimony	6.9 B	7.7 B	8.2 B	6.8 B	5.3 B	7.4 B	7 B	5.9 B	6 B	2 U	2 U
Arsenic	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1.5 U	1.5 U
Barium	200 U	18.2 J	19.2 J	20.1 J	200 U	20.9 J	15.5 J	15.6 J	17.1 J	14.6	16.4
Beryllium	5 U	5 U	0.81 B	5 U	0.86 B	0.81 B	0.84 B	0.77 B	5 U	0.5 U	0.5 U
Cadmium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.5 U	0.5 U
Calcium	101,000	123,000	108,000	105,000	107,000	108,000	126,000	125,000	85,000	106,000	106,000
Chromium	10 U	10 U	0.82 B	10 U	10 U	10 U	10 U	10 U	10 U	1 U	1 UJ
Cobalt	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.5 U	2.5 U
Copper	1.2 B	5 U	5 U	5 U	5 U	1.2 B	5 U	5 U	5 U	2 U	2 U
Cyanide	10 U	10 U	5.4 J	10 U	10 U	10 U	10 U	4.5 J	10 U	10 U	7.28 J
Iron	16.8 J	100 U	100 U	100 U	100 U	178	100 U	100 U	50.3 B	22.1 J	17.7 J
Lead	2.2 B	3 U	3 U	3 U	3 U	1.6 B	3 U	1.8 B	3 U	0.75 U	0.75 UJ
Magnesium	1,940 J	2,770 J	4,000 J	2,470 J	2,510 J	1,500 J	2,680 J	2,670 J	1,950 J	2,170	2,070 J
Manganese	4.9 J	7 B	1.6 B	13.6 B	3.3 B	15.4	1.3 B	1.4 B	27.8	12.3	12.2 J
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.16 U	0.16 U
Nickel	5 U	5 U	1.5 B	0.94 B	5 U	0.78 B	5 U	5 U	5 U	1.5 U	1.5 U
Potassium	286 J	492 J	1,750 J	5,000 U	1,520 J	5,000 U	1,030 J	1,080 J	618 J	1,700	1,660 J
Selenium	5 U	2.9 B	2.4 B	5 U	5 U	5 U	5 U	2.5 B	5 U	0.919 J	1.25 U
Silver	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.5 U	0.5 UJ
Sodium	3,650 J	5,010	8,250	4,360 B	4,570 B	3,730 J	5,360	5,390	3,580 B	3,630	3,760
Thallium	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 U	1 U
Vanadium	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	2.5 U	2.5 U
Zinc	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	21.1	2.5 U
Dissolved Metals (µg/l)											
Aluminum, Dissolved	59.1 B	60.9 B	89.4 B	64.6 B	70 B	42.8 B	52.7 B	70.6 B	56.7 B	16.1 J	25 UJ
Antimony, Dissolved	9.5 B	6.7 B	5.7 B	5.7 B	7.8 B	4.7 B	7.4 B	6.6 B	6.2 B	2 U	2 U
Arsenic, Dissolved	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1.5 U	1.5 U
Barium, Dissolved	200 U	19.4 J	20.1 J	21.8 J	200 U	20.4 J	16.2 J	16.1 J	17.3 J	14.5	15.8
Beryllium, Dissolved	5 U	0.91 J	1.5 J	0.9 J	0.88 J	5 U	0.75 J	1.2 J	5 U	0.5 U	0.5 U
Cadmium, Dissolved	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.5 U	0.5 U
Calcium, Dissolved	98,600	117,000	106,000	106,000	108,000	114,000	123,000	119,000	85,600	105,000	101,000
Chromium, Dissolved	1.5 B	10 U	10 U	10 U	1 B	10 U	10 U	10 U	10 U	0.953 J	1 UJ
Cobalt, Dissolved	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.5 U	2.5 U
Copper, Dissolved	5 U	5 U	5 U	5 U	5 U	5 U	5 U	4.2 J	3.1 J	2 U	2 U
Iron, Dissolved	100 U	100 U	100 U	100 U	100 U	116	100 U	100 U	22.5 B	15 U	15 U
Lead, Dissolved	3 U	1.8 B	2.4 B	1.7 B	2 B	2.1 B	3 U	3 U	2.5 B	0.75 U	0.75 UJ
Magnesium, Dissolved	2,030 J	2,870 J	4,210 J	2,660 J	2,690 J	1,620 J	2,780 J	2,770 J	2,060 J	2,190	1,960 J
Manganese, Dissolved	5.5 J	7.7 J	1.4 B	16	3.3 B	13.4	1.5 B	1.3 B	28.3	12.2	11.4 J
Mercury, Dissolved	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.16 U	0.16 U
Nickel, Dissolved	5 U	5 U	5 U	0.71 B	5 U	5 U	5 U	0.68 B	5 U	1.5 U	1.5 U
Potassium, Dissolved	391 B	685 B	1,970 B	128 B	1,630 B	5,000 U	1,160 B	1,230 B	637 B	1,680	1,580 J
Selenium, Dissolved	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.852 J	1.25 U
Silver, Dissolved	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.5 U	0.5 UJ
Sodium, Dissolved	3,960 J	5,410	8,920	5,560	4,760 J	4,190 J	5,910	5,850	4,100 J	3,590	3,620
Thallium, Dissolved	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 U	1 U
Vanadium, Dissolved	20 U	20 U	20 U	20 U	20 U	1.7 J	20 U	20 U	20 U	2.5 U	2.5 U
Zinc, Dissolved	8.6 B	18 B	5.6 B	11.7 B	5 B	20 U	20 U	20 U	5 B	2.47 J	1.89 J
Wet Chemistry (µg/l)											
Ethane	NA	NA	NA	2 U	NA	2 U	NA	NA	2 U	2 U	NA
Ethene	NA	NA	NA	2 U	NA	2 U	NA	NA	2 U	2 U	NA
Methane	NA	NA	NA	0.1 J	NA	0.2 J	NA	NA	0.1 J	2 U	NA

CLEAN 8012 CTO-WE74
WPNSTA Yorktown
Site 24 Groundwater
Analytical Results

Station ID	YS24-GW/SB09	YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-GW03		YS24-GW10	YS24-GW11	
Sample ID	YS24-GW09S-0610	YS24-GW04S-0610	YS24-GW05S-0610	YS24-GW06S-0610	YS24-GW07S-0610	YS24-GW08S-0610	YS24-GW03S-0610	YS24-GW03SP-0610	YS24-GW10S-0610	YS24-GW11-0713	YS24-GW11P-0713
Sample Date	06/15/10	06/16/10	06/16/10	06/16/10	06/16/10	06/15/10	06/16/10	06/16/10	06/16/10	07/08/13	07/08/13
Chemical Name											
Wet Chemistry (mg/l or pH)											
Alkalinity	NA	NA	NA	189	NA	208	NA	NA	177	275	NA
Chloride	NA	NA	NA	6.94	NA	4.3	NA	NA	5.45	4.17 M	NA
Nitrate	NA	NA	NA	0.254 J	NA	0.587	NA	NA	0.349 J	0.268	NA
Nitrite	NA	NA	NA	0.4 U	NA	0.4 U	NA	NA	0.4 U	0.1 NU	NA
pH	NA	NA	NA	7.84	NA	8.04	NA	NA	7.75	7.44 H3	NA
Sulfate	NA	NA	NA	13.8	NA	14.4	NA	NA	19.8	12.8	NA
Sulfide	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	1.69 U	NA
Total organic carbon (TOC)	NA	NA	NA	1.1	NA	1.1	NA	NA	0.75 J	2.5 U	NA

C:\Users\kmalley\Documents\Work\Graycochea_Kathleen\02_FEBRUARY\Feb 6 - Yorktown Site 24\Appendices\Appendix K. Laboratory Reports\[Shallow Groundwater Raw Data.xlsx], ccampbe6, 10/28/2013

Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

H3 - Laboratory Qualifier. Sample was received outside of EPA recommended holdtime of "ASAP"

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

M - Laboratory Qualifier. Matrix interference was observed and the reporting limit adjusted accordingly

NU - Laboratory Qualifier. MS/MSD accuracy and/or precision were outside of criteria. The analyte was not detected

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/l - Milligrams per liter

ph - pH units

µg/l - Micrograms per liter

CTO-205
Yorktown - Site 24
Sludge Area; Surface and Subsurface Soil Samples
Validated Raw Analytical Results

Station ID	YS24-GW/SB09	YS24-SS09	YS24-SS10
Sample ID	YS24-SB09-0.5-2-0410	YS24-SS09-0410	YS24-SS10-0410
Sample Date	04/19/10	04/19/10	04/20/10
Chemical Name			
Volatile Organic Compounds (µg/kg)			
1,1,1-Trichloroethane	3.6 U	3.4 U	3.2 U
1,1,2,2-Tetrachloroethane	3.6 U	3.4 U	3.2 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	3.6 U	3.4 U	3.2 U
1,1,2-Trichloroethane	3.6 U	3.4 U	3.2 U
1,1-Dichloroethane	3.6 U	3.4 U	3.2 U
1,1-Dichloroethene	3.6 U	3.4 U	3.2 U
1,2,4-Trichlorobenzene	3.6 U	3.4 U	3.2 U
1,2-Dibromo-3-chloropropane	3.6 U	3.4 U	3.2 U
1,2-Dibromoethane	3.6 U	3.4 U	3.2 U
1,2-Dichlorobenzene	3.6 U	3.4 U	3.2 U
1,2-Dichloroethane	3.6 U	3.4 U	3.2 U
1,2-Dichloropropane	3.6 U	3.4 U	3.2 U
1,3-Dichlorobenzene	3.6 U	3.4 U	3.2 U
1,4-Dichlorobenzene	3.6 U	3.4 U	3.2 U
2-Butanone	9 U	3.6 B	5.5 K
2-Hexanone	9 U	8.6 U	7.9 U
4-Methyl-2-pentanone	9 U	8.6 U	7.9 U
Acetone	31 B	77 B	67 B
Benzene	3.6 U	3.4 U	3.2 U
Bromodichloromethane	3.6 U	3.4 U	3.2 U
Bromoform	3.6 U	3.4 U	3.2 U
Bromomethane	3.6 U	3.4 U	3.2 U
Carbon disulfide	3.6 U	3.4 U	3.2 U
Carbon tetrachloride	3.6 U	3.4 U	3.2 U
Chlorobenzene	3.6 U	3.4 U	3.2 U
Chloroethane	3.6 U	3.4 U	3.2 U
Chloroform	3.6 U	3.4 U	3.2 U
Chloromethane	3.6 U	3.4 U	0.39 K
cis-1,2-Dichloroethene	3.6 U	3.4 U	3.2 U
cis-1,3-Dichloropropene	3.6 U	3.4 U	3.2 U
Cyclohexane	3.6 U	3.4 U	3.2 U
Dibromochloromethane	3.6 U	3.4 U	3.2 U
Dichlorodifluoromethane (Freon-12)	3.6 U	3.4 U	3.2 U
Ethylbenzene	3.6 U	3.4 U	3.2 U
Isopropylbenzene	3.6 U	3.4 U	3.2 U
m- and p-Xylene	7.2 U	6.9 U	6.4 U
Methyl acetate	3.6 U	18 K	3.9 K
Methylcyclohexane	3.6 U	3.4 U	3.2 U
Methylene chloride	3.6 U	3.4 U	3.2 U
Methyl-tert-butyl ether (MTBE)	3.6 U	3.4 U	3.2 U
o-Xylene	3.6 U	3.4 U	3.2 U
Styrene	3.6 U	3.4 U	3.2 U
Tetrachloroethene	3.6 U	3.4 U	3.2 U
Toluene	3.6 U	3.4 U	3.2 U
trans-1,2-Dichloroethene	3.6 U	3.4 U	3.2 U
trans-1,3-Dichloropropene	3.6 U	3.4 U	3.2 U
Trichloroethene	3.6 U	3.4 U	3.2 U
Trichlorofluoromethane(Freon-11)	3.6 U	3.4 U	3.2 U
Vinyl chloride	3.6 U	3.4 U	3.2 U
Xylene, total	3.6 U	3.4 U	3.2 U
Semivolatile Organic Compounds (µg/kg)			
1,1-Biphenyl	180 U	190 U	190 U
2,2'-Oxybis(1-chloropropane)	180 U	190 U	190 U
2,4,5-Trichlorophenol	360 U	360 U	360 U
2,4,6-Trichlorophenol	360 U	360 U	360 U
2,4-Dichlorophenol	360 UL	360 UL	360 UL
2,4-Dimethylphenol	360 U	360 U	360 U
2,4-Dinitrophenol	360 U	360 U	360 U
2,4-Dinitrotoluene	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	180 U	190 U	190 U
2-Chlorophenol	360 U	360 U	360 U
2-Methylnaphthalene	180 U	49 J	56 J
2-Methylphenol	360 U	360 U	360 U
2-Nitroaniline	180 U	190 U	190 U
2-Nitrophenol	360 U	360 U	360 U
3,3'-Dichlorobenzidine	180 U	190 U	190 U
3-Nitroaniline	360 U	360 U	360 U
4,6-Dinitro-2-methylphenol	360 U	360 U	360 U
4-Bromophenyl-phenylether	180 U	190 U	190 U
4-Chloro-3-methylphenol	360 U	360 U	360 U
4-Chloroaniline	360 U	360 U	360 U
4-Chlorophenyl-phenylether	180 U	190 U	190 U
4-Methylphenol	270 UL	270 UL	270 UL
4-Nitroaniline	360 U	360 U	360 U
4-Nitrophenol	360 U	360 U	360 U

CTO-205
Yorktown - Site 24
Sludge Area; Surface and Subsurface Soil Samples
Validated Raw Analytical Results

Station ID	YS24-GW/SB09	YS24-SS09	YS24-SS10
Sample ID	YS24-SB09-0.5-2-0410	YS24-SS09-0410	YS24-SS10-0410
Sample Date	04/19/10	04/19/10	04/20/10
Chemical Name			
Acenaphthene	180 U	190 U	190 U
Acenaphthylene	180 U	190 U	190 U
Acetophenone	180 U	190 U	190 U
Anthracene	180 U	190 U	190 U
Atrazine	180 U	190 U	190 U
Benzaldehyde	180 U	190 U	190 U
Benzo(a)anthracene	180 U	190 U	190 U
Benzo(a)pyrene	180 U	190 U	190 U
Benzo(b)fluoranthene	180 U	46 J	31 J
Benzo(g,h,i)perylene	180 U	190 U	190 U
Benzo(k)fluoranthene	180 U	190 U	190 U
bis(2-Chloroethoxy)methane	180 U	190 U	190 U
bis(2-Chloroethyl)ether	180 U	190 U	190 U
bis(2-Ethylhexyl)phthalate	180 U	190 U	190 U
Butylbenzylphthalate	180 U	190 U	190 U
Caprolactam	180 U	190 U	190 U
Carbazole	180 U	190 U	190 U
Chrysene	180 U	87 J	52 J
Dibenz(a,h)anthracene	180 U	190 U	190 U
Dibenzofuran	180 U	26 J	190 U
Diethylphthalate	180 U	190 U	190 U
Dimethyl phthalate	180 U	190 U	190 U
Di-n-butylphthalate	180 U	190 U	190 U
Di-n-octylphthalate	180 U	190 U	190 U
Fluoranthene	180 U	42 J	26 J
Fluorene	180 U	190 U	190 U
Hexachlorobenzene	180 U	190 U	190 U
Hexachlorobutadiene	180 U	190 U	190 U
Hexachlorocyclopentadiene	180 U	190 U	190 U
Hexachloroethane	180 U	190 U	190 U
Indeno(1,2,3-cd)pyrene	180 U	190 U	190 U
Isophorone	180 U	190 U	190 U
Naphthalene	180 U	33 J	42 J
n-Nitroso-di-n-propylamine	180 U	190 U	190 U
n-Nitrosodiphenylamine	180 U	190 U	190 U
Nitrobenzene	1,500 U	1,500 U	1,500 U
Pentachlorophenol	360 U	360 U	360 U
Phenanthrene	180 U	84 J	37 J
Phenol	360 U	360 U	360 U
Pyrene	180 U	52 J	29 J
Pesticide/Polychlorinated Biphenyls (µg/kg)			
4,4'-DDD	3.6 UL	0.49 J	0.47 J
4,4'-DDE	3.6 UL	1.7 J	1.4 J
4,4'-DDT	3.6 UL	1.8 J	3.2 J
Aldrin	1.8 UL	1.9 U	1.9 U
alpha-BHC	1.8 UL	0.4 J	1.9 U
alpha-Chlordane	1.8 UL	1.2 J	1.9 U
Aroclor-1016	26 U	26 U	26 U
Aroclor-1221	37 U	37 U	37 U
Aroclor-1232	18 U	19 U	19 U
Aroclor-1242	18 U	19 U	19 U
Aroclor-1248	18 U	19 U	19 U
Aroclor-1254	18 U	19 U	19 U
Aroclor-1260	18 U	19 U	19 U
beta-BHC	1.8 UL	1.6 J	1.9 U
delta-BHC	1.8 UL	0.45 J	1.9 U
Dieldrin	3.6 UL	3.6 U	3.6 U
Endosulfan I	1.8 UL	0.49 J	1.9 U
Endosulfan II	3.6 UL	3.6 U	3.6 U
Endosulfan sulfate	3.6 UL	3.6 U	0.55 J
Endrin	3.6 UL	0.59 J	3.6 U
Endrin aldehyde	3.6 UL	3.6 UL	3.6 UL
Endrin ketone	3.6 UL	1.7 J	1.3 J
gamma-BHC (Lindane)	1.8 UL	1.9 U	1.9 U
gamma-Chlordane	1.8 UL	1.9 U	1.9 U
Heptachlor	1.8 UL	0.35 J	1.9 U
Heptachlor epoxide	1.8 UL	0.42 J	1.9 U
Methoxychlor	18 UL	19 U	19 U
Toxaphene	90 UL	91 U	91 U
Explosives (µg/kg)			
1,3,5-Trinitrobenzene	1,500 UL	1,500 UL	1,500 UL
1,3-Dinitrobenzene	1,500 U	1,500 U	1,500 U
2,4,6-Trinitrotoluene	1,500 U	1,500 U	1,500 U
2-Amino-4,6-dinitrotoluene	1,500 U	1,500 U	1,500 U
2-Nitrotoluene	3,000 U	3,000 U	3,000 U
3-Nitrotoluene	3,000 U	3,000 U	3,000 U
4-Amino-2,6-dinitrotoluene	1,500 U	1,500 U	1,500 U

CTO-205
Yorktown - Site 24
Sludge Area; Surface and Subsurface Soil Samples
Validated Raw Analytical Results

Station ID	YS24-GW/SB09	YS24-SS09	YS24-SS10
Sample ID	YS24-SB09-0.5-2-0410	YS24-SS09-0410	YS24-SS10-0410
Sample Date	04/19/10	04/19/10	04/20/10
Chemical Name			
4-Nitrotoluene	3,000 U	3,000 U	3,000 U
HMX	1,500 U	1,500 U	1,500 U
RDX	1,500 U	1,500 U	1,500 U
Tetryl	3,000 U	3,000 U	3,000 U
Total Metals (mg/kg)			
Aluminum	3,640	4,160	4,590
Antimony	1.1 U	1.1 U	1.1 U
Arsenic	2.3 B	1.6 B	1.5 B
Barium	28.5	22.8	26.6
Beryllium	0.14 B	0.3 J	0.53 J
Cadmium	0.04 J	0.2 B	0.1 B
Calcium	107 J	144 J	102 J
Chromium	6.9	6.2	6.2
Cobalt	2.9	5.4	8.7
Copper	4.6	6.5	2.8
Cyanide	0.53 U	0.55 U	0.55 U
Iron	5,820	4,660	5,400
Lead	7.7	12.4	8.9
Magnesium	302 J	302 J	296 J
Manganese	76.6	132	245
Mercury	0.025 B	0.033 B	0.027 B
Nickel	3.9	5.2	6
Potassium	242 J	241 J	223 J
Selenium	0.53 U	0.55 U	0.53 U
Silver	0.53 U	0.55 U	0.53 U
Sodium	106 J	104 J	89.6 J
Thallium	1.1 U	1.1 U	1.1 U
Vanadium	8.8	10.9	9.9
Zinc	11.4	17.6	25.8
Wet Chemistry			
pH (ph)	4.61	5	4.87
Total organic carbon (TOC) (mg/kg)	12,140	43,860	21,750
Grain Size (pct/p)			
Sieve No. 004 (4.75 mm)	99.4	98.2	99.8
Sieve No. 010 (2.00 mm)	93.7	91.1	97
Sieve No. 020 (850 um)	80.5	79.6	88.2
Sieve No. 040 (425 um)	64.1	61.6	71.9
Sieve No. 060 (250 um)	28.2	27.7	30.9
Sieve No. 080 (180 um)	11.8	11.9	10.9
Sieve No. 100 (150 um)	9.8	9.7	8.8
Sieve No. 230 (63-UM)	1.3	1.6	0.8
Sieve No. 200 (75 um)	1.7	1.9	1.1

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

U - The material was analyzed for, but not detected

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from inside the estimated waste boundary
Validated Raw Analytical Results

Station ID	A06TP01	A06TP02		A06TP03	A06TP04	A06TP05	A06TP06		YS24-SB14	YS24-SB15	YS24-SB20	YS24-SB20B	YS24-SB121
Sample ID	A06TP01-02	A06TP02-01	A06TP02-02	A06TP03-02	A06TP04-02	A06TP05-02	A06TP06-01	A06TP06-02	YS24-SB14-10-11-0410	YS24-SB15-7-8-0410	YS24-SB20-7-8-0410	YS24-SB20B-7-8-0410	YS24-SB121-0410-SO
Sample Date	11/16/94	11/16/94	11/16/94	11/17/94	11/15/94	11/15/94	11/15/94	11/15/94	04/21/10	04/21/10	04/20/10	04/20/10	04/22/10
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,1,1-Trichloroethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,1,2,2-Tetrachloroethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,1,2-Trichloroethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,1-Dichloroethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,1-Dichloroethene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,2,4-Trichlorobenzene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,2-Dichlorobenzene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,2-Dichloroethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,2-Dichloroethene (total)	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	NA	NA	NA	NA	NA
1,2-Dichloropropane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,3-Dichlorobenzene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
1,4-Dichlorobenzene	380 U	440 U	440 U	57 J	380 U	370 U	380 U	380 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
2-Butanone	10 B	15 B	15 B	13 R	8 B	8 B	14 B	9 B	7.3 K	6.2 U	9.2 U	31 U	7.8 U
2-Hexanone	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	12 U	6.2 U	9.2 U	31 U	7.8 U
4-Methyl-2-pentanone	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	12 U	6.2 U	9.2 U	31 U	7.8 U
Acetone	11 B	90	46	12 UJ	12 U	8 B	15 B	11 U	61 B	3.3 B	36 B	120 B	8.3 B
Benzene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	0.51 K	2.5 U	3.7 U	12 U	3.1 U
Bromodichloromethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Bromoform	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Bromomethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Carbon disulfide	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	0.65 K	2.5 U	3.7 U	12 U	3.1 U
Carbon tetrachloride	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Chlorobenzene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Chloroethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Chloroform	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Chloromethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	8.9 K	3.1 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
cis-1,3-Dichloropropene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Dibromochloromethane	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Ethylbenzene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	0.75 K	2.5 U	3.7 U	12 U	3.1 U
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	4.8 K	2.5 U	3.7 U	12 U	3.1 U
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	0.46 B	5 U	7.4 U	25 U	6.3 U
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	4.9 K	12 U	3.5 K
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Methylene chloride	8 B	8 B	6 B	9 J	3 B	2 B	7 B	3 B	4.9 U	2.5 U	0.75 B	12 U	3.1 U
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	4.5 K	2.5 U	3.7 U	12 U	3.1 U
Styrene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	17 K	2.5 U	3.7 U	12 U	3.1 U
Tetrachloroethene	12 U	14 U	13 U	13 U	2 J	11 U	2 J	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Toluene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	0.58 B	2.5 U	0.37 B	12 U	3.1 U
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
trans-1,3-Dichloropropene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Trichloroethene	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Trichlorofluoromethane(Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Vinyl chloride	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	4.9 U	2.5 U	3.7 U	12 U	3.1 U
Xylene, total	12 U	14 U	13 U	13 U	12 U	11 U	12 U	11 U	5 K	2.5 U	3.7 U	12 U	3.1 U
Semivolatile Organic Compounds (µg/kg)													
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	220 U	250 U	200 U	340 U	210 U
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	220 U	250 U	200 U	340 U	210 U
2,4,5-Trichlorophenol	930 U	1,100 U	1,100 U	1,000 U	920 U	890 U	930 U	920 U	420 U	480 U	380 U	660 U	400 U
2,4,6-Trichlorophenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	420 U	480 U	380 U	660 U	400 U
2,4-Dichlorophenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	420 UL	480 UL	380 UL	660 UL	400 UJ
2,4-Dimethylphenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	420 U	480 U	380 U	660 U	400 U
2,4-Dinitrophenol	930 U	1,100 U	1,100 U	1,000 U	920 U	890 U	930 U	920 U	420 U	480 U	380 U	660 U	400 U
2,4-Dinitrotoluene	260 U	260 U	260 U	260 U	260 U	2,100 J	260 U	260 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	250 U	250 U	250 U	250 U	250 U	280 J	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	380 U	440 U	71 J	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
2-Chlorophenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	420 U	480 U	380 U	660 U	400 U
2-Methylnaphthalene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
2-Methylphenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	420 U	480 U	380 U	660 U	400 U
2-Nitroaniline	930 U	1,100 U	1,100 U	1,000 U	920 U	890 U	930 U	920 U	220 U	250 U	200 U	340 U	210 U
2-Nitrophenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	420 U	480 U	380 U	660 U	400 U
3,3'-Dichlorobenzidine	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
3-Nitroaniline	930 U	1,100 U	1,100 U	1,000 U	920 U	890 U	930 U	920 U	420 U	480 U	380 U	660 U	400 U
4,6-Dinitro-2-methylphenol	930 U	1,100 U	1,100 U	1,000 U	920 U	890 U	930 U	920 U	420 U	480 U	380 U	660 U	400 UJ
4-Bromophenyl-phenylether	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
4-Chloro-3-methylphenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	420 U	480 U	380 U	660 U	400 U
4-Chloroaniline	380 UJ	440 U	440 UJ	420 UJ	380 UJ	370 UJ	380 U	380 UJ	420 U	480 U	380 U	660 U	400 U
4-Chlorophenyl-phenylether	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
4-Methylphenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	320 UL	370 UL	290 UL	500 UL	300 UJ
4-Nitroaniline	930 U	1,100 U	1,100 U	1,000 U	920 U	890 U	930 U	920 U	420 U	480 U	380 U	660 U	400 U

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from inside the estimated waste boundary
Validated Raw Analytical Results

Station ID	A06TP01	A06TP02		A06TP03	A06TP04	A06TP05	A06TP06		YS24-SB14	YS24-SB15	YS24-SB20	YS24-SB20B	YS24-SB121
Sample ID	A06TP01-02	A06TP02-01	A06TP02-02	A06TP03-02	A06TP04-02	A06TP05-02	A06TP06-01	A06TP06-02	YS24-SB14-10-11-0410	YS24-SB15-7-8-0410	YS24-SB20-7-8-0410	YS24-SB20B-7-8-0410	YS24-SB121-0410-SO
Sample Date	11/16/94	11/16/94	11/16/94	11/17/94	11/15/94	11/15/94	11/15/94	11/15/94	04/21/10	04/21/10	04/20/10	04/20/10	04/22/10
Chemical Name													
4-Nitrophenol	930 U	1,100 U	1,100 U	1,000 U	920 U	890 U	930 U	920 U	420 U	480 U	380 U	660 U	400 UJ
Acenaphthene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Acenaphthylene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	220 U	250 U	200 U	340 U	210 U
Anthracene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	220 U	250 U	200 U	340 U	210 U
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	50 J	250 U	200 U	340 U	210 U
Benzo(a)anthracene	380 U	440 U	440 U	420 U	380 U	370 U	42 J	380 U	220 U	250 U	200 U	340 U	210 U
Benzo(a)pyrene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Benzo(b)fluoranthene	380 U	440 U	440 U	420 U	380 U	370 U	56 J	380 U	220 U	250 U	200 U	340 U	210 U
Benzo(g,h,i)perylene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Benzo(k)fluoranthene	380 U	440 U	440 U	420 U	380 U	370 U	46 J	380 U	220 U	250 U	200 U	340 U	210 U
bis(2-Chloroethoxy)methane	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
bis(2-Chloroethyl)ether	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
bis(2-Chloroisopropyl)ether	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	380 U	48 J	650	2,000	380 U	370 U	76 J	83 J	720	250 U	100 J	1,400	1,300
Butylbenzylphthalate	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	220 U	250 U	200 U	340 U	210 U
Carbazole	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Chrysene	380 U	440 U	440 U	420 U	380 U	370 U	50 J	380 U	220 U	250 U	200 U	340 U	210 U
Dibenz(a,h)anthracene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Dibenzofuran	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Diethylphthalate	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Dimethyl phthalate	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Di-n-butylphthalate	46 J	51 J	440 U	82 J	58 J	48 J	380 U	54 J	320	250 U	200 U	340 U	210 U
Di-n-octylphthalate	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Fluoranthene	380 U	440 U	440 U	420 U	380 U	370 U	88 J	380 U	220 U	250 U	200 U	340 U	210 U
Fluorene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Hexachlorobenzene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Hexachlorobutadiene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Hexachlorocyclopentadiene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Hexachloroethane	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Indeno(1,2,3-cd)pyrene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Isophorone	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Naphthalene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
n-Nitroso-di-n-propylamine	380 U	440 U	440 U	93 J	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
n-Nitrosodiphenylamine	380 U	440 U	440 U	93 J	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Nitrobenzene	260 U	260 U	260 U	260 U	260 U	260 U	260 U	260 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Pentachlorophenol	930 U	1,100 U	1,100 U	1,000 U	920 U	890 U	930 U	920 U	420 U	480 U	380 U	660 U	400 U
Phenanthrene	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	220 U	250 U	200 U	340 U	210 U
Phenol	380 U	440 U	440 U	420 U	380 U	370 U	380 U	380 U	420 U	480 U	380 U	660 U	400 U
Pyrene	380 U	440 U	440 U	420 U	380 U	370 U	68 J	380 U	220 U	250 U	200 U	340 U	210 U
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	2 J	1.5 J	4 UL
4,4'-DDE	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	1.7 J	3.8 L	4 UL
4,4'-DDT	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	4.9	14 J	4 UL
Aldrin	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	7.7 J	2.5 U	2 U	3.4 UL	2.1 UL
alpha-BHC	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	460	2.5 U	2 U	3.4 UL	2.1 UL
alpha-Chlordane	2 U	4.5 U	4.5 U	1,200 J	2 U	1.9 U	2 UL	2 U	2.2 U	2.5 U	3.4	1.8 J	2.1 UL
Aroclor-1016	38 U	88 U	88 U	1,700 U	38 U	37 U	38 UL	38 U	31 U	35 U	28 U	48 U	29 UL
Aroclor-1221	78 U	180 U	180 U	3,400 U	77 U	74 U	78 UL	77 U	44 U	50 U	40 U	68 U	41 UL
Aroclor-1232	38 U	88 U	88 U	1,700 U	38 U	37 U	38 UL	38 U	22 U	25 U	20 U	34 U	21 UL
Aroclor-1242	38 U	88 U	88 U	1,700 U	38 U	37 U	38 UL	38 U	22 U	25 U	20 U	34 U	21 UL
Aroclor-1248	38 U	88 U	88 U	1,700 U	38 U	37 U	38 UL	38 U	22 U	25 U	20 U	34 U	21 UL
Aroclor-1254	38 U	770 J	12,000 J	79,000	38 U	37 U	38 UL	38 U	5,100	25 U	20 U	34 U	21 UL
Aroclor-1260	38 U	340	4,900	1,700 U	38 U	37 U	38 UL	38 U	590	25 U	20 U	61 J	21 UL
beta-BHC	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	1.6 L	2 U	5.5 U	2.5 U	2 U	3.4 UL	0.52 J
delta-BHC	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	26	2.5 U	2 U	3.4 UL	2.1 UL
Dieldrin	3.8 U	7.3 J	90 J	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	0.53 B	5.8 L	4 UL
Endosulfan I	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	2.2 U	2.5 U	2 U	3.4 UL	2.1 UL
Endosulfan II	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	3.8 U	1.5 J	4 UL
Endosulfan sulfate	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.6 L	3.8 U	4.2 U	4.9 U	3.8 U	6.6 UL	4 UL
Endrin	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	3.8 U	1.8 J	4 UL
Endrin aldehyde	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 UL	4.9 UL	3.8 UL	0.85 J	4 UL
Endrin ketone	3.8 U	8.8 U	8.8 U	170 U	3.8 U	3.7 U	3.8 UL	3.8 U	4.2 U	4.9 U	3.8 U	6.6 UL	4 UL
gamma-BHC (Lindane)	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	0.39 B	2.5 U	2 U	3.4 UL	2.1 UL
gamma-Chlordane	2 U	4.5 U	37 J	87 U	2 U	1.9 U	2 UL	2 U	2.2 U	2.5 U	2.2	1.3 J	2.1 UL
Heptachlor	2 U	4.5 U	170 R	87 U	2 U	1.9 U	2 UL	2 U	200	2.5 U	2 U	3.4 UJ	2.1 UL
Heptachlor epoxide	2 U	4.5 U	4.5 U	87 U	2 U	1.9 U	2 UL	2 U	2.2 U	2.5 U	2 U	0.88 J	2.1 UL
Methoxychlor	20 U	45 U	45 U	870 U	20 U	19 U	20 UL	20 U	5.3 J	25 U	20 U	34 UL	21 UL
Toxaphene	200 U	450 U	450 U	8,700 U	200 U	190 U	200 UL	200 U	110 U	120 U	97 U	170 UL	100 UL
Explosives (µg/kg)													
1,3,5-Trinitrobenzene	250 U	250 U	250 U	450 UJ	250 U	450 J	250 U	250 U	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL
1,3-Dinitrobenzene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,4,6-Trinitrotoluene	250 U	250 U	250 U	250 U	250 U	4,100 J	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Nitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from inside the estimated waste boundary
Validated Raw Analytical Results

Station ID	A06TP01	A06TP02		A06TP03	A06TP04	A06TP05	A06TP06		YS24-SB14	YS24-SB15	YS24-SB20	YS24-SB20B	YS24-SB121
Sample ID	A06TP01-02	A06TP02-01	A06TP02-02	A06TP03-02	A06TP04-02	A06TP05-02	A06TP06-01	A06TP06-02	YS24-SB14-10-11-0410	YS24-SB15-7-8-0410	YS24-SB20-7-8-0410	YS24-SB20B-7-8-0410	YS24-SB121-0410-SO
Sample Date	11/16/94	11/16/94	11/16/94	11/17/94	11/15/94	11/15/94	11/15/94	11/15/94	04/21/10	04/21/10	04/20/10	04/20/10	04/22/10
Chemical Name													
3-Nitrotoluene	220 U	220 U	220 U	220 U	220 U	220 U	220 U	220 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
4-Amino-2,6-dinitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
4-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
HMX	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
RDX	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Tetryl	650 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
Total Metals (mg/kg)													
Aluminum	3,570	7,360	3,340	9,270	3,390	7,320	4,640	4,130	13,200	14,500	5,980	344,000	20,200
Antimony	2.7 R	3.2 R	3.2 R	3.1 UL	2.7 R	2.6 UL	2.7 R	2.8 UL	0.6 J	0.54 J	1.1 U	1.9 U	1 J
Arsenic	0.79 K	4.5	5.6	3.4	1.1 K	1.7	1.2 K	1.4	2.4 B	5.2	1.7 B	1.9 U	1.2 U
Barium	15.7	32.2	31.3	327	24.2	31.3	31.1	30.4	40.1	27.7 J	22.5 J	23.3 J	43.1
Beryllium	0.22 U	0.31	0.36	0.2	0.22 U	0.19	0.22 U	0.16	0.22 B	0.21 B	0.17 B	0.27 B	0.61 U
Cadmium	0.33 U	101	7.3	51.9	0.33 U	0.32 U	3.8	2.1	575	0.24 B	2.6	5.2	0.75
Calcium	539	3,610	196,000	953	509	797	494	432	2,050	2,530	326 J	5,710	5,990
Chromium	5.6 L	22.8 L	8.1 L	28.3	4.3 L	7.7	6.1 L	5.8	21.8	45.6	10.7	64.6	21.7
Cobalt	0.64	3.8	3.4	7.9	0.65	1.1	1.1	1.3	4.5	1.2	0.62	0.21 B	10.8
Copper	1.9	14.8	44.5	181	0.72	1.6	16.8	23	122	9.4	4.9	15,600	75.2
Cyanide	2.9 U	3.3 U	3.3 U	3.2 U	2.9 U	2.8 U	2.9 U	2.9 U	0.62 U	0.73 U	0.55 U	0.96 U	0.61 U
Iron	2,920 J	16,500 J	14,800 J	12,400	2,480 J	4,750	3,590 J	3,510	17,100	19,400	5,000	3,180	21,300
Lead	3.6	26.8	33.9	182	3.1	7.6	10.2	16	34	11.1	11.7	54.2	35.4
Magnesium	250	1,050	2,020	538	128	348	272	270	609 J	2,520	452 J	4,200	5,090
Manganese	8.8 J	45.6 J	144 J	41.7	10.1 J	21.8	52 J	76.8	89.6	13.8	36.1	2,860	126
Mercury	0.12 UL	0.13 UL	0.12 UL	0.12 U	0.1 UL	0.11 U	0.3 L	0.15	0.069 B	0.043 B	0.11 B	0.097 B	0.04 U
Nickel	1.4	13.7	12.9	62	1.4	2.7	1.2	1.5	44.8	2.9	2.1	17.5	10.9
Potassium	313	1,170	772	540	159	221	351	325	599 J	2,420	807	150 J	611 J
Selenium	0.58 U	0.68 U	0.68 U	0.65 U	0.58 U	0.55 U	0.58 U	0.59 U	0.63 U	0.7 U	0.57 U	0.96 U	0.61 U
Silver	0.44 U	0.52 U	0.53 U	1.9	0.44 U	0.43 U	0.45 U	0.46 U	0.21 B	0.7 U	0.59	1.3	0.61 U
Sodium	19.6	48.1	1,170	51.4	64.4	72.8	20.4	73.5	108 J	172 J	113 J	164 J	485 J
Thallium	0.89 U	1 U	1.1 U	1 UL	0.89 U	0.85 UL	0.9 U	0.91 UL	1.3 U	1.4 U	1.1 U	1.9 U	1.2 U
Vanadium	8.4	18.2	7.6	16.2	6.5	12.3	8.4	7.3	17.2	31	14.8	29.1	89.4
Zinc	6 J	618 J	100 J	1,580	7.9 J	18.1	40.3 J	44	603	14.6	287	606	72.1
Wet Chemistry													
pH (ph)	NA	NA	NA	NA	NA	NA	NA	NA	7.25	6.8	5.32	7.7	NA
Total organic carbon (TOC) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	6,659	4,254	2,657	4,571	NA
Grain Size (pct/p)													
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	98.1	93.7	100	NA	NA
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	NA	NA	NA	NA	89.4	63.4	94.8	NA	NA
Sieve No. 020 (850 um)	NA	NA	NA	NA	NA	NA	NA	NA	76.2	42.5	84.2	NA	NA
Sieve No. 040 (425 um)	NA	NA	NA	NA	NA	NA	NA	NA	64.6	29.2	72.6	NA	NA
Sieve No. 060 (250 um)	NA	NA	NA	NA	NA	NA	NA	NA	37.1	21.5	41.5	NA	NA
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	NA	18.6	14.9	14.3	NA	NA
Sieve No. 100 (150 um)	NA	NA	NA	NA	NA	NA	NA	NA	15.6	13.7	9.9	NA	NA
Sieve No. 230 (63-UM)	NA	NA	NA	NA	NA	NA	NA	NA	1.8	1.7	0.7	NA	NA
Sieve No. 200 (75 um)	NA	NA	NA	NA	NA	NA	NA	NA	2.7	2.6	1.4	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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from outside the estimated waste boundary
Validated Raw Analytical Results

Station ID	A06SB03				A06SB04			A06SB05				A06SB06				A06SB10			YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07
Sample ID	A06SB03-01	A06SB03-01D	A06SB03-07	A06SB03-05	A06SB04-01	A06SB04-08	A06SB04-05	A06SB05-01	A06SB05-06	A06SB05-05	A06SB05-05D	A06SB06-01	A06SB06-06	A06SB06-04	A06SB06-04D	A06SB10-01	A06SB10-07	A06SB10-05	YS24-SB04-0_5-2-0410	YS24-SB05-0_5-2-0410	YS24-SB06-0_5-2-0410	YS24-SB07-0_5-2-0410
Sample Date	11/15/94	11/15/94	11/15/94	11/15/94	11/04/94	11/04/94	11/04/94	11/08/94	11/08/94	11/08/94	11/08/94	11/06/94	11/06/94	11/06/94	11/06/94	11/08/94	11/08/94	11/08/94	04/15/10	04/15/10	04/15/10	04/19/10
Chemical Name																						
Volatile Organic Compounds (µg/kg)																						
1,1,1-Trichloroethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
1,1,2,2-Tetrachloroethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 UJ	3.4 U	3.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
1,1,2-Trichloroethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
1,1-Dichloroethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
1,1-Dichloroethene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
1,2,4-Trichlorobenzene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	5 UL	3.6 UJ	3.4 U	3.5 U
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 UL	3.6 UJ	3.4 U	3.5 U
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 UL	3.6 U	3.4 U	3.5 U
1,2-Dichlorobenzene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	5 UL	3.6 UJ	3.4 U	3.5 U
1,2-Dichloroethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
1,2-Dichloroethene (total)	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 R	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 R	12 R	14 R	NA	NA	NA	NA
1,2-Dichloropropane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
1,3-Dichlorobenzene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	5 UL	3.6 U	3.4 U	3.5 U
1,4-Dichlorobenzene	380 U	380 U	440 U	420 U	55 B	64 B	100 B	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	5 UL	3.6 UJ	3.4 U	3.5 U
2-Butanone	11 B	88	12 B	14 B	12 U	13 U	13 U	13 U	9 J	13 U	15 U	12 U	11 U	12 R	11 U	12 U	12 U	14 U	5.6 K	4.8 B	2.7 B	3.4 B
2-Hexanone	11 U	11 U	13 U	3 B	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 UJ	11 UJ	12 U	12 U	14 U	13 U	9 U	8.5 U	8.6 U
4-Methyl-2-pentanone	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 UJ	11 UJ	12 U	12 U	14 U	13 U	9 U	8.5 U	8.6 U
Acetone	15 B	8 B	23 B	11 B	12 U	13 U	13 U	13 U	5 B	13 U	15 U	12 U	11 U	2 J	3 J	12 U	9 J	14 U	44 B	29 B	32 B	35 B
Benzene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Bromodichloromethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Bromoform	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Bromomethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
Carbon disulfide	11 U	11 U	2 J	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	1.9 K	3.6 U	2.8 K	3.5 U
Carbon tetrachloride	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Chlorobenzene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Chloroethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
Chloroform	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
Chloromethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
cis-1,3-Dichloropropene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
Dibromochloromethane	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
Ethylbenzene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	2.8 K	1.1 K	3.4 U	3.5 U
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 UL	3.6 U	3.4 U	3.5 U
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.25 B	7.2 U	6.8 U	6.9 U
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	14 K	35 K
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
Methylene chloride	4 B	3 B	6 B	8 B	12 U	13 U	13 U	13 U	4 J	24	40	3 J	11 U	12 U	11 U	8 J	25	18	0.65 B	0.36 B	0.37 B	3.5 U
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
Styrene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Tetrachloroethene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Toluene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	2 B	0.81 B	0.29 B	0.4 B
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
trans-1,3-Dichloropropene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Trichloroethene	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 UL	3.6 U	3.4 U	3.5 U
Trichlorofluoromethane(Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	3.6 U	3.4 U	3.5 U
Vinyl chloride	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	5 U	3.6 U	3.4 U	3.5 U
Xylene, total	11 U	11 U	13 U	14 U	12 U	13 U	13 U	13 U	11 U	13 U	15 U	12 U	11 U	12 U	11 U	12 U	12 U	14 U	0.24 B	3.6 U	3.4 U	3.5 U
Semivolatile Organic Compounds (µg/kg)																						
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	200 U	190 U
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	200 U	190 U
2,4,5-Trichlorophenol	920 U	930 U	1,100 U	1,000 U	920 U	990 U	1,000 U	1,100 U	880 U	1,100 U	1,200 U	910 U	910 U	950 U	870 U	890 U	980 U	1,100 U	380 U	370 U	400 U	370 U
2,4,6-Trichlorophenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	380 U	370 U	400 U	370 U
2,4-Dichlorophenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	380 UL	370 U	400 UL	370 UL
2,4-Dimethylphenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	380 U	370 U	400 U	370 U
2,4-Dinitrophenol	920 U	380 U	1,100 U	1,000 U	920 U	990 U	1,000 U	1,100 U	880 U	1,100 U	1,200 U	910 U	910 U	950 U	870 U	890 U	980 U	1,100 U	380 U	370 U	400 U	370 U
2,4-Dinitrotoluene	260 U	260 U	260 U	260 U	0.26 U	260 U	260 U	430	260 U	680	450	260 U	260 U	260 U	260 U	260 U	260 U	260 U	1,500 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	500	250 U	730	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
2-Chlorophenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	380 U	370 U	400 U	370 U
2-Methylnaphthalene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
2-Methylphenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	380 U	370 U	400 U	370 U
2-Nitroaniline	920 U	930 U	1,100 U	1,000 U	920 U	990 U	1,000 U	1,100 U	880 U	1,100 U	1,200 U	910 U	910 U	950 U	870 U	890 U	980 U	1,100 U	200 U	190 U	200 U	190 U
2-Nitrophenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	380 U	370 U	400 U	370 U
3,3'-Dichlorobenzidine	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 UJ	360 U	440 UJ	480 U	370 U	370 U	390 U	360 U	370 UJ	400 UJ	450 UJ	200 U	190 U	200 U	190 U
3-Nitroaniline	920 U	930 U	1,100 U	1,000 U	920 U	990 U	1,000 U	1,100 U	880 U	1,100 U	1,200 U	910 U	910 U	950 U	870 U	890 U	980 U	1,100 U	380 U	370 U	400 U	370 U
4,6-Dinitro-2-methylphenol	920 U	930 U	1,100 U	1,000 U	920 U	990 U	1,000 U	1,100 U	880 U	1,100 U	1,200 U	910 U	910 U	950 U	870 U	890 U	980 U	1,100 U	380 U	370 U	400 U	370 U
4-Bromophenyl-phenylether	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
4-Chloro-3-methylphenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	380 U	370 U	400 U	370 U
4-Chloroaniline	380 UJ	380 U	440 UJ	420 UJ	380 U	410 U	430 U	450 UJ	360 UJ	440 UJ	480 UJ	370 U	370 U	390 U	360 U	370 UJ	400 UJ	450 UJ	380 U	370 U	400 U	370 U
4-Chlorophenyl-phenylether	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
4-Methylphenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	290 UL	280 U	300 UL	280 UL
4-Nitroaniline	920 U	930 U	1,100 U	1,000 U	920 U	990 U	1,000 U	1,100 U	880 U	1,100 U	1,200 U	910 U	910 U	950 U	870 U	890 U	980 U	1,100 U	380 U	370 U	400 U	370 U

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from outside the estimated waste boundary
Validated Raw Analytical Results

Station ID	A06SB03				A06SB04			A06SB05				A06SB06				A06SB10			YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07
Sample ID	A06SB03-01	A06SB03-01D	A06SB03-07	A06SB03-05	A06SB04-01	A06SB04-08	A06SB04-05	A06SB05-01	A06SB05-06	A06SB05-05	A06SB05-05D	A06SB06-01	A06SB06-06	A06SB06-04	A06SB06-04D	A06SB10-01	A06SB10-07	A06SB10-05	YS24-SB04-0_5-2-0410	YS24-SB05-0_5-2-0410	YS24-SB06-0_5-2-0410	YS24-SB07-0_5-2-0410
Sample Date	11/15/94	11/15/94	11/15/94	11/15/94	11/04/94	11/04/94	11/04/94	11/08/94	11/08/94	11/08/94	11/08/94	11/06/94	11/06/94	11/06/94	11/06/94	11/08/94	11/08/94	11/08/94	04/15/10	04/15/10	04/15/10	04/19/10
Chemical Name																						
4-Nitrophenol	920 U	930 U	1,100 U	1,000 U	920 U	990 U	1,000 U	1,100 U	880 U	1,100 U	1,200 U	910 U	910 U	950 U	870 U	890 U	980 U	1,100 U	380 U	370 U	400 U	370 U
Acenaphthene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Acenaphthylene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	200 U	190 U
Anthracene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	200 U	190 U
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	200 U	190 U
Benzo(a)anthracene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	36 J	39 J	200 U	190 U
Benzo(a)pyrene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	180 J	44 J	200 U	190 U
Benzo(b)fluoranthene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	300	64 J	200 U	190 U
Benzo(g,h,i)perylene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	130 J	41 J	200 U	190 U
Benzo(k)fluoranthene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	260	65 J	200 U	190 U
bis(2-Chloroethoxy)methane	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
bis(2-Chloroethyl)ether	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
bis(2-Chloroisopropyl)ether	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	380 U	380 U	380 J	45 J	55 J	50 J	430 U	470	91 J	440 U	480 U	58 J	62 J	140 J	68 J	370 U	61 J	65 J	200 U	190 U	61 J	190 U
Butylbenzylphthalate	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	1,200	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	200 U	190 U
Carbazole	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Chrysene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	110 J	68 J	200 U	190 U
Dibenz(a,h)anthracene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	45 J	190 U	200 U	190 U
Dibenzofuran	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Diethylphthalate	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Dimethyl phthalate	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Di-n-butylphthalate	49 J	380 U	59 J	63 J	340 J	230 J	330 J	64 J	210 J	55 J	150 J	400	240 J	2,100	330 J	45 J	80 J	130 J	200 U	190 U	200 U	190 U
Di-n-octylphthalate	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Fluoranthene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	62 J	90 J	25 J	190 U
Fluorene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Hexachlorobenzene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Hexachlorobutadiene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Hexachlorocyclopentadiene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Hexachloroethane	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Indeno(1,2,3-cd)pyrene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	150 J	190 U	200 U	190 U
Isophorone	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Naphthalene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
n-Nitroso-di-n-propylamine	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
n-Nitrosodiphenylamine	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	190 U	200 U	190 U
Nitrobenzene	260 U	260 U	260 U	260 U	0.26 U	260 U	260 U	260 U	260 U	260 U	260 U	260 U	260 U	260 U	260 U	260 U	260 U	260 U	1,500 U	1,500 U	1,500 U	1,500 U
Pentachlorophenol	920 U	930 U	1,100 U	1,000 U	920 U	990 U	1,000 U	1,100 U	360 U	1,100 U	1,200 U	910 U	910 U	950 U	870 U	890 U	980 U	1,100 U	380 U	370 U	400 U	370 U
Phenanthrene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	200 U	25 J	200 U	190 U
Phenol	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	380 U	370 U	400 U	370 U
Pyrene	380 U	380 U	440 U	420 U	380 U	410 U	430 U	450 U	360 U	440 U	480 U	370 U	370 U	390 U	360 U	370 U	400 U	450 U	120 J	81 J	200 U	190 U
Pesticide/Polychlorinated Biphenyls (µg/kg)																						
4,4'-DDD	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	1.3 L	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	3.8 UL	3.7 UJ	4 UL	3.7 U
4,4'-DDE	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	2.2 L	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	3.8 UL	0.77 J	4 UL	3.7 U
4,4'-DDT	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	1.4 L	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	3.8 UL	3.7 UJ	0.99 L	3.7 U
Aldrin	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	2 UL	1.9 UJ	2 UL	1.9 U
alpha-BHC	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	1.9 L	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	2 UL	1.9 UJ	2 UL	1.9 U
alpha-Chlordane	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	2 UL	1.9 UJ	0.26 J	0.49 J
Aroclor-1016	38 UJ	38 U	44 U	42 U	38 U	41 U	43 U	44 R	36 U	44 U	48 U	37 UJ	37 U	39 U	36 UJ	37 U	40 U	45 U	28 U	27 UJ	29 U	27 U
Aroclor-1221	77 UJ	78 U	89 U	85 U	77 U	83 U	87 U	90 R	73 U	89 U	97 U	76 UJ	76 U	80 U	73 UJ	74 U	81 U	92 U	40 U	38 UJ	41 U	38 U
Aroclor-1232	38 UJ	38 U	44 U	42 U	38 U	41 U	43 U	44 R	36 U	44 U	48 U	37 UJ	37 U	39 U	36 UJ	37 U	40 U	45 U	20 U	19 UJ	20 U	19 U
Aroclor-1242	38 UJ	38 U	44 U	42 U	38 U	41 U	43 U	44 R	36 U	44 U	48 U	37 UJ	37 U	39 U	36 UJ	37 U	40 U	45 U	20 U	19 UJ	20 U	19 U
Aroclor-1248	38 UJ	38 U	44 U	42 U	38 U	41 U	43 U	44 R	36 U	44 U	48 U	37 UJ	37 U	39 U	36 UJ	37 U	40 U	45 U	20 U	19 UJ	20 U	19 U
Aroclor-1254	38 UJ	38 U	44 U	42 U	38 U	41 U	43 U	44 R	36 U	44 U	48 U	37 UJ	37 U	39 U	36 UJ	37 U	40 U	45 U	20 U	19 UJ	20 U	19 U
Aroclor-1260	38 UJ	38 U	44 U	42 U	38 U	41 U	43 U	44 R	36 U	44 U	48 U	37 UJ	37 U	39 U	36 UJ	37 U	40 U	45 U	20 U	19 UJ	20 U	19 U
beta-BHC	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	1.1 L	1.9 U	5.4	3.2 J	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	0.99 UL	1.9 UJ	1 UL	1.9 U
delta-BHC	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	2 UL	1.9 UJ	2 UL	0.25 J
Dieldrin	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	1.7 L	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	3.8 UL	3.7 UJ	4 UL	3.7 U
Endosulfan I	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	1.3 J	1.5 J	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	2 UL	1.9 UJ	2 UL	1.9 U
Endosulfan II	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	4.4 R	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	3.8 UL	3.7 UJ	4 UL	3.7 U
Endosulfan sulfate	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	4.4 R	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	3.8 UL	3.7 UJ	4 UL	3.7 U
Endrin	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	4.4 R	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	3.8 UL	3.7 UJ	4 UL	3.7 U
Endrin aldehyde	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	4.4 R	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	0.66 L	0.6 J	4 UL	3.7 UL
Endrin ketone	3.8 UJ	3.8 U	4.4 U	4.2 U	3.8 U	4.1 U	4.3 U	4.4 R	3.6 U	4.4 U	4.8 U	3.7 UJ	3.7 U	3.9 U	3.6 UJ	3.7 U	4 U	4.5 U	3.8 UL	3.7 UJ	4 UL	3.7 U
gamma-BHC (Lindane)	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	2 UL	1.9 UJ	2 UL	1.9 U
gamma-Chlordane	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	0.25 J	1.9 UJ	0.43 L	0.24 J
Heptachlor	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	2 UJ	1.9 UJ	2 UL	1.9 U
Heptachlor epoxide	1.9 UJ	2 U	2.3 U	2.2 U	1.9 U	2.1 U	2.2 U	2.3 R	1.9 U	2.3 U	2.5 U	1.9 UJ	1.9 U	2 U	1.8 UJ	1.9 U	2.1 U	2.3 U	2 UJ	1.9 UJ	2 UL	1.9 U
Methoxychlor	19 UJ	20 U	23 U	22 U	19 U	21 U	22 U	23 R	19 U	23 U	25 U	19 UJ	19 U	20 U	18 UJ	19 U	21 U	23 U	20 UJ	19 UJ	20 UL	19 U
Toxaphene	190 UJ	200 U	230 U	220 U	190 U	210 U	220 U	230 R	190 U	230 U	250 U	190 UJ	190 U	200 U	180 UJ	190 U	210 U	230 U	97 UJ	92 UJ	100 UL	92 U
Explosives (µg/kg)																						
1,3,5-Trinitrobenzene	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	660	250 U	1,200	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 UL	1,500 U	1,500 UL
1,3-Dinitrobenzene	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U
2,4,6-Trinitrotoluene	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	1,200	250 U	3,400	1,500	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 U
2-Nitrotoluene	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U	3,000 U

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from outside the estimated waste boundary
Validated Raw Analytical Results

Station ID	A06SB03				A06SB04			A06SB05				A06SB06				A06SB10			YS24-GW/SO04	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07
Sample ID	A06SB03-01	A06SB03-01D	A06SB03-07	A06SB03-05	A06SB04-01	A06SB04-08	A06SB04-05	A06SB05-01	A06SB05-06	A06SB05-05	A06SB05-05D	A06SB06-01	A06SB06-06	A06SB06-04	A06SB06-04D	A06SB10-01	A06SB10-07	A06SB10-05	YS24-SB04-0_5-2-0410	YS24-SB05-0_5-2-0410	YS24-SB06-0_5-2-0410	YS24-SB07-0_5-2-0410
Sample Date	11/15/94	11/15/94	11/15/94	11/15/94	11/04/94	11/04/94	11/04/94	11/08/94	11/08/94	11/08/94	11/08/94	11/06/94	11/06/94	11/06/94	11/06/94	11/08/94	11/08/94	11/08/94	04/15/10	04/15/10	04/15/10	04/19/10
Chemical Name																						
3-Nitrotoluene	220 U	220 U	220 U	220 U	0.22 U	220 U	220 U	220 U	220 U	220 U	220 U	220 U	220 U	220 U	220 U	220 U	220 U	220 U	3,000 U	3,000 U	3,000 U	3,000 U
4-Amino-2,6-dinitrotoluene	250 U	250 U	250 U	250 U	0.25 U	250 U	250 U	250 U	250 U	370	280	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U	1,500 U
4-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,000 U	3,000 U	3,000 U	3,000 U
HMX	500 U	500 U	500 U	500 U	0.5 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	1,500 U	1,500 U	1,500 U	1,500 U
RDX	500 U	500 U	500 U	500 U	0.5 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	1,500 U	1,500 U	1,500 U	1,500 U
Tetryl	650 U	650 U	650 U	650 U	0.65 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	3,000 R	3,000 U	3,000 U	3,000 U
Total Metals (mg/kg)																						
Aluminum	4,090	4,880	3,310	6,760	5,710	2,350	4,490	5,140	6,810	4,090	8,180	2,670	9,170	5,346	4,140	3,960	4,820	6,120	6,860	6,300	7,470	4,330
Antimony	2.8 UL	2.8 UL	3.2 R	3 R	2.7 UL	3 UL	3.1 UL	3.3 UL	4.6 L	3.2 R	3.4 R	2.7 UL	2.7 UL	2.9 UL	2.6 UL	2.7 R	2.9 R	3.2 R	1.5	1.1 U	0.66 L	1.1 U
Arsenic	1.9	1.4	5.8	9.2	1.4	5.7	13.6	1.6	9.4	12.2	9.7	1	16.5	49.5	5.1	2.4 K	8	8.9	113	1.1 B	3.9	1.1 U
Barium	28	29.2	19.7	25.9	20.2	13.5	14.3	40	14.1	9.4	16.7	23.6	22.5	10.3	8.9	35.6	19.9	27	33.6	19.5 J	32.4	29.4
Beryllium	0.21	0.24	0.27	0.57	0.07 K	0.18 K	0.15 K	0.23 B	0.89 B	0.26 U	0.28 U	0.09	0.56	0.15	0.12	0.35	0.39	0.63	0.78	0.39 J	0.49 J	0.18 B
Cadmium	0.34 U	0.35 U	0.4 U	0.37 U	0.34 U	0.37 U	0.38 U	0.85	0.32 U	0.42 B	0.42 U	0.51 K	0.33 U	0.35 U	0.32 U	0.33 U	0.36 U	0.39 U	0.9	0.58	0.33 J	0.55 U
Calcium	386	326	######	1,770	445	23,000	2,440	413	5,020	1,160	1,550	224	62,400	793	642	374	58,900	2,170	34,200	11,600	3,690	191 J
Chromium	6	6.1	11.3 L	20.5 L	6.1	7	22.1	6.4	25.3	21.3 L	30.9 L	3	21.9	28.6	11.1	5.6 L	17.1 L	18 L	16.2	7.4	17.6	4.4
Cobalt	4.4	4.7	2.7	6.5	0.9	3	2.2	1.4	12.3	1.5	2	0.81	4	1.2	0.8	6.8	4.6	7.3	3.7	1.5	3.8	0.92
Copper	1.9	1.8	3.9	8	2.1	3.7	7.7	23.3	7.3	7.2	6.9	2.8 B	6.8	3.9	3.3 B	10.6	6	8.9	4.5	4.7	5.7	1.6
Cyanide	2.9 U	2.9 U	3.3 U	3.2 U	2.9 U	3.1 U	3.2 U	3.4 UL	2.8 UL	3.3 U	3.6 U	2.8 UL	2.8 UL	3 UL	3.5 L	2.8 U	3 U	3.4 U	0.58 U	0.55 U	0.59 U	0.53 U
Iron	5,920	4,830	11,300 J	21,700 J	4,150	10,700	22,300	3,340	35,800	17,200 J	16,700 J	1,720	19,800	11,500	4,900	6,380 J	15,300 J	21,200 J	12,900	6,250	14,700	2,400
Lead	4.8	5.3	4.5	9.4	6.3	3.9	9.1	11.8	7.7	9.4	8.9	4.7	6.9	9	4.7	15.3	6.8	9.4	18	11.1	11.4	6.8
Magnesium	320	407	2,150	2,110	318	1,860	719	286	1,160	710	1,410	185	1,390	491	426	281	1,900	1,890	1,310	946	1,200	270 J
Manganese	61.6	68.3	96.5 J	51.8 J	14.4	102	8.2	42.2	50.3	5 J	9.5 J	32.5	79.4	4.8	4.7	151 J	113 J	54.5 J	97.7	113	85.5	68.2
Mercury	0.11 U	0.11 U	0.12 UL	0.12 UL	0.11 UL	0.11 UL	0.13 UL	0.56 K	0.1 UL	0.13 UL	0.13 UL	0.11 UL	0.11 UL	0.11 UL	0.1 UL	0.11 UL	0.12 UL	0.12 UL	0.038 U	0.018 J	0.028 J	0.023 B
Nickel	3	3.8	3.9	10.7	1.2	5.8	1.1 U	3.6 B	26.7	1.1 U	1.6	1.2	7.5	1.6	2.7	4.9	7	13.4	5.6	2.6	7.6	1.7
Potassium	283	274	934	1,250	236	760	759	251	1,010	854	1,580	210 B	1,140	873	789	162	1,120	1,010	1,830	487 J	1,240 J	218 J
Selenium	0.6 U	0.6 U	0.69 U	0.63 U	0.59 U	0.64 U	0.66 U	0.7 U	0.55 U	0.67 U	0.73 U	0.59 U	0.57 U	0.61 U	0.56 U	0.57 U	0.63 U	0.68 U	0.58 U	0.55 U	0.59 UL	0.55 U
Silver	0.46 U	1.2	0.53 U	0.49 u	0.45 U	0.49 U	0.51 U	0.54 U	0.42 U	0.52 U	0.57 U	0.45 U	0.44 U	0.47 u	0.43 U	0.44 U	0.48 U	0.52 U	0.58 U	0.55 U	0.59 U	0.55 U
Sodium	73.9	79.4	1,440	42.4	25.9	1,310	43.4	77.7	77.1	91.2	102	19.8	246	72.6	23	70.5	425	37	404 J	178 J	203 J	106 J
Thallium	0.92 UL	0.92 UL	1.1 U	0.97 u	0.9 UL	0.99 UL	1 UL	1.1 U	0.85 U	1 U	1.1 U	0.9 UL	0.88 UL	0.94 UL	0.86 UL	0.88 U	0.96 U	1 U	1.2 U	1.1 U	1.2 U	1.1 U
Vanadium	10.4	9.5	10.9	17.8	9.7	5.1	27.6	8.1	23.4	26	28.9	4.5	25.7	99.3	17.9	9.6	15.5	16.8	19.6	12.3	19	6.1
Zinc	10.6	13.5	23.1 J	39.6 J	10.1 J	14.6 J	9.5 J	61.1 J	76 J	10.1 J	17.4 J	6.4 J	23.9 J	6.1 J	5 J	26.4 J	31.9 J	45.7 J	26.1	26.4	34.6	8
Wet Chemistry																						
pH (ph)	5.54	5.52	8.11	5.39	5.8	8.75	6.4	5.48	7.27	6.29	8.36	5.57	7.42	6.47	5.71	5.45	7.65	5.63	7.93	8.23	8.06	5.46
Total organic carbon (TOC) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,655	7,269	9,577	5,792
Grain Size (pct/p)																						
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97	95.9	99.5	98.5
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	87.8	88.1	93.9	92.3
Sieve No. 020 (850 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	73.9	69.3	72.6	82.1
Sieve No. 040 (425 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	59.5	50.4	56.1	63.5
Sieve No. 060 (250 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	37.1	29	38.4	34.2
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15.6	16.4	26.8	15.4
Sieve No. 100 (150 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	13.1	24.2	12.1
Sieve No. 230 (63-UM)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5	1.6	9.8	1
Sieve No. 200 (75 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.5	3	10.4	1.2

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
u
U - The material was analyzed for, but not detected
u
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
pct/p - Percent Passed
ph - pH units
µg/kg - Micrograms per kilogram

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from outside the estimated waste boundary
Validated Raw Analytical Results

Station ID	YS24-GW/SO08	YS24-SB10	YS24-SB11	YS24-SB12		YS24-SB13	YS24-SB16	YS24-SB17	YS24-SB18	YS24-SB19	YS24-SO01	YS24-SO02		YS24-SO03
Sample ID	YS24-SB08-0_5-2-0410	YS24-SB10-5-6-0410	YS24-SB11-5-6-0410	YS24-SB12-5-6-0410	YS24-SB12P-5-6-0410	YS24-SB13-5-6-0410	YS24-SB16-5-6-0410	YS24-SB17-5-6-0410	YS24-SB18-7-8-0410	YS24-SB19-5-6-0410	YS24-SB01-0_5-2-0410	YS24-SB02-0_5-2-0410	YS24-SB02P-0_5-2-0410	YS24-SB03-0_5-2-0410
Sample Date	04/15/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/20/10	04/20/10	04/20/10	04/16/10	04/16/10	04/16/10	04/16/10
Chemical Name														
Volatile Organic Compounds (µg/kg)														
1,1,1-Trichloroethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,1,2,2-Tetrachloroethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,1,2-Trichloroethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,1-Dichloroethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,1-Dichloroethene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,2,4-Trichlorobenzene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	0.33 J	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,2-Dibromo-3-chloropropane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,2-Dibromoethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,2-Dichlorobenzene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,2-Dichloroethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,3-Dichlorobenzene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
1,4-Dichlorobenzene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	0.23 B	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
2-Butanone	14 U	9 U	11 U	7.9 U	8.7 U	8.7 U	2.2 B	8.2 U	8.1 U	7 U	6.5 K	4.2 B	10 K	3.4 B
2-Hexanone	14 U	9 U	11 U	7.9 U	8.7 U	8.7 U	8 U	8.2 U	8.1 U	7 U	9 U	9.4 U	15 U	8.9 U
4-Methyl-2-pentanone	14 U	9 U	11 U	7.9 U	8.7 U	8.7 U	8 U	8.2 U	8.1 U	7 U	9 U	9.4 U	15 U	8.9 U
Acetone	11 B	9 U	16 B	9.7 B	11 B	8.7 U	24 B	10 B	3.6 B	11 B	54 B	9.4 U	85 B	35 B
Benzene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Bromodichloromethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Bromoform	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Bromomethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Carbon disulfide	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Carbon tetrachloride	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Chlorobenzene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Chloroethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Chloroform	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Chloromethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	0.66 K	3.6 U
cis-1,2-Dichloroethene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
cis-1,3-Dichloropropene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Cyclohexane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Dibromochloromethane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Dichlorodifluoromethane (Freon-12)	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Ethylbenzene	3.1 J	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Isopropylbenzene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
m- and p-Xylene	11 U	7.2 U	0.29 B	6.3 U	6.9 U	7 U	6.4 U	6.5 U	0.16 B	5.6 U	7.2 U	7.6 U	12 U	7.2 U
Methyl acetate	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	35 K	3.3 U	3.2 U	2.9 K	3.6 U	650 K	680 K	3.6 U
Methylcyclohexane	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Methylene chloride	0.71 B	0.47 B	0.8 B	3.2 U	0.39 B	3.5 U	3.2 U	2.6 B	0.4 B	0.6 B	0.42 B	1.5 B	0.85 B	3.6 U
Methyl-tert-butyl ether (MTBE)	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
o-Xylene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Styrene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Tetrachloroethene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Toluene	1.4 B	3.6 U	4.3 U	0.28 B	0.28 B	3.5 U	3.2 U	0.3 B	3.2 U	0.19 B	3.6 U	0.51 B	6.1 U	3.6 U
trans-1,2-Dichloroethene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
trans-1,3-Dichloropropene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Trichloroethene	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Trichlorofluoromethane(Freon-11)	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Vinyl chloride	5.6 U	3.6 U	4.3 U	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	3.2 U	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Xylene, total	5.6 U	3.6 U	0.29 B	3.2 U	3.5 U	3.5 U	3.2 U	3.3 U	0.16 B	2.8 U	3.6 U	3.8 U	6.1 U	3.6 U
Semivolatile Organic Compounds (µg/kg)														
1,1-Biphenyl	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
2,2'-Oxybis(1-chloropropane)	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
2,4,5-Trichlorophenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
2,4,6-Trichlorophenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
2,4-Dichlorophenol	410 UL	440 UL	480 UL	390 UL	390 UL	400 UL	370 UL	380 UL	390 UL	390 UL	370 UL	360 UL	360 UL	370 UL
2,4-Dimethylphenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
2,4-Dinitrophenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
2,4-Dinitrotoluene	1,500 U	1,500 U	97 J	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
2-Chlorophenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
2-Methylnaphthalene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
2-Methylphenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
2-Nitroaniline	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
2-Nitrophenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
3,3'-Dichlorobenzidine	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
3-Nitroaniline	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
4,6-Dinitro-2-methylphenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
4-Bromophenyl-phenylether	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
4-Chloro-3-methylphenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
4-Chloroaniline	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
4-Chlorophenyl-phenylether	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
4-Methylphenol	310 UL	330 UL	360 UL	290 UL	290 UL	300 UL	280 UL	290 UL	290 UL	290 UL	280 UL	270 UL	270 UL	280 UL
4-Nitroaniline	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from outside the estimated waste boundary
Validated Raw Analytical Results

Station ID	YS24-GW/SO08	YS24-SB10	YS24-SB11	YS24-SB12		YS24-SB13	YS24-SB16	YS24-SB17	YS24-SB18	YS24-SB19	YS24-SO01	YS24-SO02		YS24-SO03
Sample ID	YS24-SB08-0_5-2-0410	YS24-SB10-5-6-0410	YS24-SB11-5-6-0410	YS24-SB12-5-6-0410	YS24-SB12P-5-6-0410	YS24-SB13-5-6-0410	YS24-SB16-5-6-0410	YS24-SB17-5-6-0410	YS24-SB18-7-8-0410	YS24-SB19-5-6-0410	YS24-SB01-0_5-2-0410	YS24-SB02-0_5-2-0410	YS24-SB02P-0_5-2-0410	YS24-SB03-0_5-2-0410
Sample Date	04/15/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/20/10	04/20/10	04/20/10	04/16/10	04/16/10	04/16/10	04/16/10
Chemical Name														
4-Nitrophenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
Acenaphthene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Acenaphthylene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Acetophenone	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Anthracene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Atrazine	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Benzaldehyde	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Benzo(a)anthracene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Benzo(a)pyrene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Benzo(b)fluoranthene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Benzo(g,h,i)perylene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Benzo(k)fluoranthene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
bis(2-Chloroethoxy)methane	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
bis(2-Chloroethyl)ether	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	170 J	160 J	250 U	200 U	200 U	200 U	190 U	120 J	200 U	200 U	190 U	180 U	180 U	190 U
Butylbenzylphthalate	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Caprolactam	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Carbazole	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Chrysene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Dibenz(a,h)anthracene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Dibenzofuran	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Diethylphthalate	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Dimethyl phthalate	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Di-n-butylphthalate	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Di-n-octylphthalate	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Fluoranthene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	34 J	190 U
Fluorene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Hexachlorobenzene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Hexachlorobutadiene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Hexachlorocyclopentadiene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Hexachloroethane	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Indeno(1,2,3-cd)pyrene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Isophorone	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Naphthalene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
n-Nitroso-di-n-propylamine	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
n-Nitrosodiphenylamine	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Nitrobenzene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Pentachlorophenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
Phenanthrene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	180 U	190 U
Phenol	410 U	440 U	480 U	390 U	390 U	400 U	370 U	380 U	390 U	390 U	370 U	360 U	360 U	370 U
Pyrene	210 U	230 U	250 U	200 U	200 U	200 U	190 U	200 U	200 U	200 U	190 U	180 U	34 J	190 U
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U	3.9 U	0.42 L	3.7 U	3.6 UL	3.6 UL	3.7 UL
4,4'-DDE	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U	3.9 U	3.9 UL	3.7 U	3.6 UL	3.6 UL	3.7 UL
4,4'-DDT	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U	3.9 U	2.2 L	1 J	3.6 UL	0.57 J	3.7 UL
Aldrin	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	1.8 UL	1.8 UL	1.9 UL
alpha-BHC	2.1 UL	2.3 U	2.5 U	0.22 J	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	1.8 UL	1.8 UL	1.9 UL
alpha-Chlordane	2.1 UL	0.3 J	2.5 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	1.8 UL	0.25 J	1.9 UL
Aroclor-1016	30 U	32 U	35 U	28 U	28 U	29 U	27 U	28 U	28 U	28 UL	27 U	26 U	26 U	27 U
Aroclor-1221	43 U	45 U	49 U	40 U	40 U	41 U	38 U	40 U	40 U	40 UL	38 U	37 U	37 U	38 U
Aroclor-1232	21 U	23 U	25 U	20 U	20 U	20 U	19 U	20 U	20 U	20 UL	19 U	18 U	18 U	19 U
Aroclor-1242	21 U	23 U	25 U	20 U	20 U	20 U	19 U	20 U	20 U	20 UL	19 U	18 U	18 U	19 U
Aroclor-1248	21 U	23 U	25 U	20 U	20 U	20 U	19 U	20 U	20 U	20 UL	19 U	18 U	18 U	19 U
Aroclor-1254	21 U	23 U	25 U	20 U	20 U	20 U	19 U	20 U	20 U	20 UL	19 U	18 U	18 U	19 U
Aroclor-1260	21 U	23 U	25 U	20 U	20 U	20 U	19 U	20 U	20 U	20 UL	19 U	18 U	18 U	19 U
beta-BHC	1.1 UL	2.3 U	1 J	2 U	2 U	1 U	1.9 U	2 U	2 U	2 UL	0.95 U	0.93 UL	0.93 UL	0.95 UL
delta-BHC	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	1.8 UL	1.8 UL	1.9 UL
Dieldrin	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U	3.9 U	3.9 UL	3.7 U	3.6 UL	3.6 UL	3.7 UL
Endosulfan I	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	1.8 UL	1.8 UL	1.9 UL
Endosulfan II	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U	3.9 U	3.9 UL	3.7 U	3.6 UL	3.6 UL	3.7 UL
Endosulfan sulfate	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U	3.9 U	3.9 UL	3.7 U	3.6 UL	3.6 UL	3.7 UL
Endrin	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U	3.9 U	3.9 UL	0.38 J	3.6 UL	3.6 UL	3.7 UL
Endrin aldehyde	4.1 UL	4.4 UL	4.8 UL	3.9 UL	3.9 UL	4 UL	3.7 UL	3.8 UL	3.9 UL	3.9 UL	0.4 J	0.37 L	3.6 UL	3.7 UL
Endrin ketone	4.1 UL	4.4 U	4.8 U	3.9 U	3.9 U	4 U	3.7 U	3.8 U	3.9 U	3.9 UL	3.7 U	3.6 UL	3.6 UL	3.7 UL
gamma-BHC (Lindane)	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	1.8 UL	1.8 UL	1.9 UL
gamma-Chlordane	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	0.2 L	0.31 J	1.9 UL
Heptachlor	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	1.8 UL	1.8 UL	1.9 UL
Heptachlor epoxide	2.1 UL	2.3 U	2.5 U	2 U	2 U	2 U	1.9 U	2 U	2 U	2 UL	1.9 U	1.8 UL	1.8 UL	1.9 UL
Methoxychlor	21 UL	23 U	25 U	20 U	20 U	20 U	19 U	20 U	20 U	20 UL	19 U	18 UL	18 UL	19 UL
Toxaphene	100 UL	110 U	120 U	98 U	98 U	100 U	93 U	97 U	98 U	98 UL	92 U	90 UL	90 UL	92 UL
Explosives (µg/kg)														
1,3,5-Trinitrobenzene	1,500 U	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 U	1,500 U	1,500 U	1,500 U
1,3-Dinitrobenzene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,4,6-Trinitrotoluene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Amino-4,6-dinitrotoluene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Nitrotoluene	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U

CTO-205
Yorktown - Site 24
Subsurface soil samples collected from outside the estimated waste boundary
Validated Raw Analytical Results

Station ID	YS24-GW/SO08	YS24-SB10	YS24-SB11	YS24-SB12		YS24-SB13	YS24-SB16	YS24-SB17	YS24-SB18	YS24-SB19	YS24-SO01	YS24-SO02		YS24-SO03
Sample ID	YS24-SB08-0_5-2-0410	YS24-SB10-5-6-0410	YS24-SB11-5-6-0410	YS24-SB12-5-6-0410	YS24-SB12P-5-6-0410	YS24-SB13-5-6-0410	YS24-SB16-5-6-0410	YS24-SB17-5-6-0410	YS24-SB18-7-8-0410	YS24-SB19-5-6-0410	YS24-SB01-0_5-2-0410	YS24-SB02-0_5-2-0410	YS24-SB02P-0_5-2-0410	YS24-SB03-0_5-2-0410
Sample Date	04/15/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/21/10	04/20/10	04/20/10	04/20/10	04/16/10	04/16/10	04/16/10	04/16/10
Chemical Name														
3-Nitrotoluene	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
4-Amino-2,6-dinitrotoluene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
4-Nitrotoluene	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
HMX	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
RDX	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Tetryl	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
Total Metals (mg/kg)														
Aluminum	5,340	11,200	12,400	10,900	12,100	12,400	10,800	9,630	7,240	7,920	6,410	5,890	5,890	7,930
Antimony	0.55 J	0.76 J	0.99 J	0.37 J	0.33 J	0.39 J	1.1 U	1.2 U	1.2 U	0.4 J	0.37 J	1.1 U	0.32 J	1.1 U
Arsenic	5.3	15.7	22.3	1.4 B	0.81 B	5.9	1.2 B	1.1 B	6.8	1.2 U	0.94 J	0.74 J	0.57 J	0.63 J
Barium	28.2	15.6 J	27.3 J	30	32.1	26.7	43.4	22.2 J	15.3 J	12.6 J	38.1	38.3	38.4	28.1
Beryllium	0.34 J	0.29 J	0.14 B	0.13 B	0.1 B	0.12 B	0.14 B	0.13 B	0.14 B	0.14 B	0.31 J	0.27 J	0.34 J	0.13 B
Cadmium	0.35 J	0.22 B	0.38 J	0.58 U	0.56 U	0.21 B	0.55 U	0.58 U	0.09 B	0.59 U	0.34 J	0.45 J	0.35 J	0.04 J
Calcium	212,000	1,410	1,410	848	995	1,490	445 J	865	877	887	683	658	593	416 J
Chromium	14.7	37.8	43.4	12.9	13.6	23.4	11.2	14.7	17.5	12.3	7.4	8.6	5.5	8.2
Cobalt	2.3	1	0.91	0.89	1	1.2	1.4	0.85	0.54 J	0.67	1.6	1.5	1.5	0.97
Copper	3.7	7.1	7.5	1.3	1.4	5.9	1.5	1.7	2.1	1.8	4.1	5.1	5.7	1.3
Cyanide	0.62 U	0.66 U	0.72 U	0.59 U	0.58 U	0.57 U	0.56 U	0.58 U	0.59 U	0.56 U	0.54 U	0.52 U	0.52 U	0.55 U
Iron	11,100	27,700	34,100	6,550	7,080	13,000	6,370	6,930	9,670	6,270	4,730	3,630	3,130	4,930
Lead	7.2	9	12.7	7.5	7.7	9.9	7.6	7.3	7	7.4	15.4	9.4	7.9	7.1
Magnesium	2,790	1,870	1,140	538 J	566	877	519 J	652	619	484 J	350 J	324 J	311 J	454 J
Manganese	136	10.4	11.4	12.8	11.2	9.6	34.3	8.2	7.6	8.6	106	109	93.8	17.9
Mercury	0.041 U	0.046 B	0.026 B	0.039 U	0.027 B	0.04 U	0.037 U	0.022 B	0.019 B	0.039 U	0.045	0.024 J	0.025 J	0.018 J
Nickel	5.2	2	2.2	2.5	2.7	2.7	3.1	2.2	1.4	1.6	3.5	2.8	2.7	2.6
Potassium	1,380	2,450	1,350	515 J	471 J	882	499 J	857	1,170	602	337 J	254 J	234 J	312 J
Selenium	0.62 U	0.66 U	0.72 U	0.58 U	0.56 U	0.6 U	0.55 U	0.58 U	0.59 U	0.59 U	0.56 U	0.53 U	0.53 U	0.55 U
Silver	0.62 U	0.66 U	0.72 U	0.58 U	0.56 U	0.6 U	0.55 U	0.58 U	0.59 U	0.59 U	0.56 U	0.53 U	0.53 U	0.55 U
Sodium	2,070	119 J	120 J	106 J	105 J	123 J	105 J	110 J	130 J	110 J	176 J	160 J	138 J	168 J
Thallium	1.2 U	1.3 U	1.4 U	1.2 U	1.1 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	1.1 U
Vanadium	14	33.9	65.5	22.7	19.6	29.9	17.9	21.4	24.9	17.6	11.6	10.7	9.4	13.7
Zinc	18.2	12.3	13	8.4	8.5	9	6.8	6.6	5.8	7.4	32	34.9	32.8	7.9
Wet Chemistry														
pH (ph)	8.35	5.8	6.17	6.62	NA	7.18	5.76	6.12	6.15	6.11	7.2	7.12	NA	5.76
Total organic carbon (TOC) (mg/kg)	7,436	3,355	3,227	1,783	NA	2,293	4,328	3,315	4,458	2,505	8,265	6,827	NA	2,771
Grain Size (pct/p)														
Sieve No. 004 (4.75 mm)	75.9	98.9	97.6	100	NA	99.7	100	100	99.8	100	89.5	99	NA	99.8
Sieve No. 010 (2.00 mm)	58.1	79.9	75.6	94.2	NA	88.9	93.8	95.4	91.7	96.2	80.4	93.2	NA	90.9
Sieve No. 020 (850 um)	39.5	58.5	56.3	81	NA	74.4	81.4	84	77.6	83.5	65.5	79.3	NA	72.2
Sieve No. 040 (425 um)	25.4	44.6	42.3	69.9	NA	61.5	68.7	76.6	63.4	65.3	46.1	62.7	NA	54.2
Sieve No. 060 (250 um)	16.4	34.9	25.1	35.1	NA	34.6	41.7	56.7	28	35.1	26.4	38.8	NA	21.1
Sieve No. 080 (180 um)	9.6	23.4	13.9	10.4	NA	14.8	18.6	22.7	11	14.6	13.6	20.8	NA	8.7
Sieve No. 100 (150 um)	7.3	19.7	11.9	7.4	NA	10.9	13.5	17.6	8.3	11.2	10.4	16.2	NA	6.9
Sieve No. 230 (63-UM)	0.3	2.7	2	0.9	NA	1.2	0.9	2.2	0.8	0.8	1.4	5.3	NA	0.4
Sieve No. 200 (75 um)	0.5	4.5	2.6	1.3	NA	1.8	2.2	3.6	1.1	1.3	2.2	6.2	NA	0.6

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

u

U - The material was analyzed for, but not detected

u

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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

CTO-205
Yorktown - Site 24
Surface soil samples collected from inside the estimated waste boundary
Valdiated Raw Analytical Results

Station ID	A06SS06	A06SS08		A06TP01	A06TP03	A06TP04	A06TP05	YS24-SS14	YS24-SS15	YS24-SS20
Sample ID	A06SS06-00	A06SS08-00	A06SS08D-00	A06TP01-01	A06TP03-01	A06TP04-01	A06TP05-01	YS24-SS14-0410	YS24-SS15-0410	YS24-SS20-0410
Sample Date	11/06/94	11/06/94	11/06/94	11/16/94	11/17/94	11/15/94	11/15/94	04/16/10	04/16/10	04/15/10
Chemical Name										
Volatile Organic Compounds (µg/kg)										
1,1,1-Trichloroethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
1,1,2,2-Tetrachloroethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
1,1,2-Trichloroethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
1,1-Dichloroethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
1,1-Dichloroethene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
1,2,4-Trichlorobenzene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	4.6 U	3.3 U	3.7 U
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
1,2-Dichlorobenzene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	4.6 U	3.3 U	3.7 U
1,2-Dichloroethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
1,2-Dichloroethene (total)	11 U	11 U	12 U	11 U	12 U	11 U	11 U	NA	NA	NA
1,2-Dichloropropane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
1,3-Dichlorobenzene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	4.6 U	3.3 U	3.7 U
1,4-Dichlorobenzene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	4.6 U	3.3 U	3.7 U
2-Butanone	6 J	11 R	4 J	12 B	12 R	10 B	10 B	15	4.2 B	6.3 B
2-Hexanone	11 UJ	11 UJ	12 UJ	11 U	12 U	11 U	11 U	11 U	8.2 U	9.2 U
4-Methyl-2-pentanone	11 UJ	11 UJ	12 UJ	11 U	12 U	11 U	11 U	11 U	8.2 U	9.2 U
Acetone	11 U	11 U	12 U	11 B	12 UJ	8 B	19 B	280 B	62 B	72 B
Benzene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Bromodichloromethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Bromoform	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Bromomethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Carbon disulfide	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Carbon tetrachloride	11 U	11 U	12 U	2 J	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Chlorobenzene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Chloroethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Chloroform	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Chloromethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	0.57 J
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
cis-1,3-Dichloropropene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
Dibromochloromethane	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
Ethylbenzene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	9.1 U	6.6 U	7.4 U
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	8.2	2.8 J	5.1 B
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
Methylene chloride	11 U	11 U	12 U	8 B	13	5 B	3 B	1.3 B	0.59 B	0.44 B
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
o-Xylene	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
Styrene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Tetrachloroethene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Toluene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	0.42 B	0.28 B	3.7 U
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
trans-1,3-Dichloropropene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Trichloroethene	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Trichlorofluoromethane(Freon-11)	NA	NA	NA	NA	NA	NA	NA	4.6 U	3.3 U	3.7 U
Vinyl chloride	11 U	11 U	12 U	11 U	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Xylene, total	11 U	11 U	12 U	1 J	12 U	11 U	11 U	4.6 U	3.3 U	3.7 U
Semivolatile Organic Compounds (µg/kg)										
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	190 U
2,2'-Oxybis(1-chloropropane)	370 U	380 U	380 U	NA	NA	NA	NA	200 U	190 U	190 U
2,4,5-Trichlorophenol	910 U	930 U	930 U	920 U	950 U	1,300 U	920 U	380 U	370 U	370 U
2,4,6-Trichlorophenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	380 U	370 U	370 U
2,4-Dichlorophenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	380 UL	370 UL	370 U
2,4-Dimethylphenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	380 U	370 U	370 U
2,4-Dinitrophenol	910 U	930 U	930 U	920 U	950 U	1,300 U	920 U	380 U	370 U	370 U
2,4-Dinitrotoluene	260 U	260 U	260 U	260 U	260 U	260 U	260 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
2-Chlorophenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	380 U	370 U	370 U
2-Methylnaphthalene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
2-Methylphenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	380 U	370 U	370 U
2-Nitroaniline	910 U	930 U	930 U	920 U	950 U	1,300 U	920 U	200 U	190 U	190 U
2-Nitrophenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	380 U	370 U	370 U
3,3'-Dichlorobenzidine	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
3-Nitroaniline	910 U	930 U	930 U	920 U	950 U	1,300 U	920 U	380 U	370 U	370 U
4,6-Dinitro-2-methylphenol	910 U	930 U	930 U	920 U	950 U	1,300 U	920 U	380 U	370 U	370 U
4-Bromophenyl-phenylether	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
4-Chloro-3-methylphenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	380 U	370 U	370 U
4-Chloroaniline	370 U	380 U	380 U	380 UJ	390 U	540 UJ	380 UJ	380 U	370 U	370 U
4-Chlorophenyl-phenylether	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
4-Methylphenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	290 UL	280 UL	280 U
4-Nitroaniline	910 U	930 U	930 U	920 U	950 U	1,300 U	920 U	380 U	370 U	370 U

CTO-205
Yorktown - Site 24
Surface soil samples collected from inside the estimated waste boundary
Valdiated Raw Analytical Results

Station ID	A06SS06	A06SS08		A06TP01	A06TP03	A06TP04	A06TP05	YS24-SS14	YS24-SS15	YS24-SS20
Sample ID	A06SS06-00	A06SS08-00	A06SS08D-00	A06TP01-01	A06TP03-01	A06TP04-01	A06TP05-01	YS24-SS14-0410	YS24-SS15-0410	YS24-SS20-0410
Sample Date	11/06/94	11/06/94	11/06/94	11/16/94	11/17/94	11/15/94	11/15/94	04/16/10	04/16/10	04/15/10
Chemical Name										
4-Nitrophenol	910 U	930 U	930 U	920 U	950 U	1,300 U	920 U	380 U	370 U	370 U
Acenaphthene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Acenaphthylene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Acetophenone	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	190 U
Anthracene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Atrazine	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	190 U
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	190 U
Benzo(a)anthracene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Benzo(a)pyrene	40 J	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Benzo(b)fluoranthene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	38 J
Benzo(g,h,i)perylene	170 J	100 J	72 J	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Benzo(k)fluoranthene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	29 J
bis(2-Chloroethoxy)methane	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
bis(2-Chloroethyl)ether	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
bis(2-Chloroisopropyl)ether	370 U	380 U	380 U	380 U	390 U	540 U	380 U	NA	NA	NA
bis(2-Ethylhexyl)phthalate	370 U	380 U	380 U	380 U	220 J	540 U	380 U	200 U	190 U	840
Butylbenzylphthalate	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	69 J
Caprolactam	NA	NA	NA	NA	NA	NA	NA	200 U	190 U	190 U
Carbazole	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Chrysene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Dibenz(a,h)anthracene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Dibenzofuran	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Diethylphthalate	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Dimethyl phthalate	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Di-n-butylphthalate	680	290 J	520	47 J	390 U	61 J	42 J	200 U	190 U	190 U
Di-n-octylphthalate	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Fluoranthene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Fluorene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Hexachlorobenzene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Hexachlorobutadiene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Hexachlorocyclopentadiene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Hexachloroethane	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Indeno(1,2,3-cd)pyrene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Isophorone	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Naphthalene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
n-Nitroso-di-n-propylamine	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
n-Nitrosodiphenylamine	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Nitrobenzene	260 U	260 U	260 U	260 U	260 U	260 U	260 U	1,500 U	1,500 U	1,500 U
Pentachlorophenol	910 U	930 U	930 U	920 U	950 U	1,300 U	920 U	380 U	370 U	370 U
Phenanthrene	370 U	380 U	380 U	380 U	390 U	540 U	380 U	200 U	190 U	190 U
Phenol	370 U	380 U	380 U	380 U	390 U	540 U	380 U	380 U	370 U	370 U
Pyrene	57 J	380 U	380 U	380 U	390 U	540 U	380 U	200 U	25 J	190 U
Pesticide/Polychlorinated Biphenyls (µg/kg)										
4,4'-DDD	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	3.7 UJ
4,4'-DDE	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	2.3 J
4,4'-DDT	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	5.6 J
Aldrin	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	1.9 UL	1.9 UJ
alpha-BHC	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	1.9 UL	0.29 J
alpha-Chlordane	1.9 UJ	2 UJ	2 UJ	2 UJ	9.8 J	2.8 UJ	2 U	2 UL	0.23 J	3.4 J
Aroclor-1016	37 UJ	38 UJ	38 UJ	38 UJ	39 U	54 UJ	38 U	28 U	27 U	27 UJ
Aroclor-1221	76 UJ	78 UJ	78 UJ	77 UJ	80 U	110 UJ	77 U	39 U	38 U	38 UJ
Aroclor-1232	37 UJ	38 UJ	38 UJ	38 UJ	39 U	54 UJ	38 U	20 U	19 U	19 UJ
Aroclor-1242	37 UJ	38 UJ	38 UJ	38 UJ	39 U	54 UJ	38 U	20 U	19 U	19 UJ
Aroclor-1248	37 UJ	38 UJ	38 UJ	38 UJ	39 U	54 UJ	38 U	20 U	19 U	19 UJ
Aroclor-1254	37 UJ	38 UJ	38 UJ	38 UJ	590	54 UJ	38 U	20 U	19 U	19 UJ
Aroclor-1260	37 UJ	38 UJ	38 UJ	38 UJ	190 J	54 UJ	38 U	20 U	19 U	19 UJ
beta-BHC	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	0.98 UL	2.9 J	1.4 J
delta-BHC	1.9 UJ	2 UJ	2 UJ	2 UJ	0.84 J	2.8 UJ	2 U	2 UL	1.9 UL	1.9 UJ
Dieldrin	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	3.7 UJ
Endosulfan I	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	1.9 UL	1.9 UJ
Endosulfan II	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	3.7 UJ
Endosulfan sulfate	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	3.7 UJ
Endrin	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	29	5.4 UJ	3.8 U	3.8 UL	3.7 UL	0.41 J
Endrin aldehyde	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	3.7 UJ
Endrin ketone	3.7 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.9 U	5.4 UJ	3.8 U	3.8 UL	3.7 UL	3.7 UJ
gamma-BHC (Lindane)	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	1.9 UL	0.52 J
gamma-Chlordane	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	0.37 J	2.1 J
Heptachlor	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	0.2 J	1.9 UL	1.9 UJ
Heptachlor epoxide	1.9 UJ	2 UJ	2 UJ	2 UJ	2 U	2.8 UJ	2 U	2 UL	1.9 UL	1.9 UJ
Methoxychlor	19 UJ	20 UJ	20 UJ	20 UJ	20 U	28 UJ	20 U	20 UL	19 UL	19 UJ
Toxaphene	190 UJ	200 UJ	200 UJ	200 UJ	200 U	280 UJ	200 U	95 UL	93 UL	93 UJ
Explosives (µg/kg)										
1,3,5-Trinitrobenzene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 UL
1,3-Dinitrobenzene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U
2,4,6-Trinitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U
2-Nitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	3,000 U	3,000 U	3,000 U

CTO-205
Yorktown - Site 24
Surface soil samples collected from inside the estimated waste boundary
Valdiated Raw Analytical Results

Station ID	A06SS06	A06SS08		A06TP01	A06TP03	A06TP04	A06TP05	YS24-SS14	YS24-SS15	YS24-SS20
Sample ID	A06SS06-00	A06SS08-00	A06SS08D-00	A06TP01-01	A06TP03-01	A06TP04-01	A06TP05-01	YS24-SS14-0410	YS24-SS15-0410	YS24-SS20-0410
Sample Date	11/06/94	11/06/94	11/06/94	11/16/94	11/17/94	11/15/94	11/15/94	04/16/10	04/16/10	04/15/10
Chemical Name										
3-Nitrotoluene	220 U	220 U	220 U	220 U	220 U	220 U	220 U	3,000 U	3,000 U	3,000 U
4-Amino-2,6-dinitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	1,500 U	1,500 U	1,500 U
4-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	3,000 U	3,000 U	3,000 U
HMX	500 U	500 U	500 U	500 U	500 U	500 U	500 U	1,500 U	1,500 U	1,500 U
RDX	500 U	500 U	500 U	500 U	500 U	500 U	500 U	1,500 U	1,500 U	1,500 U
Tetryl	650 U	650 U	650 U	650 U	650 U	650 U	650 U	3,000 U	3,000 U	3,000 U
Total Metals (mg/kg)										
Aluminum	8,030	4,310	4,060	4,740	11,600	11,200	5,570	8,120	7,640	6,050
Antimony	2.6 UL	2.8 UL	2.8 UL	2.7 R	2.9 UL	3.9 R	2.8 R	0.44 J	0.44 J	0.36 J
Arsenic	2.1	2.6	2	1.3 K	5.6	2.5 K	1 K	1.9	2.9	0.34 B
Barium	45.5	39	38.9	19.3	73.8	50.8	36.3	43.8	31.5	31.9
Beryllium	0.24	0.36	0.23	0.22 U	0.22	0.34	0.24	0.4 J	0.33 J	0.3 J
Cadmium	0.32 U	0.41 K	0.55 K	0.33 U	786	0.49 U	0.34 U	0.13 J	0.17 J	0.95
Calcium	828	915	509	512	1,300	1,090	466	1,400	1,380	215 J
Chromium	10.2	5.6	4.5	5.8 L	20.6	11.4 L	4.5 L	12.8	12.3	8.1
Cobalt	2.2	4.2	1.9	0.9	6	2.5	1	2.2	1.7	0.71
Copper	3.4	4.3	3.2 B	2.1	74.4	2.9	1.3	39	6.1	44.7
Cyanide	2.8 UL	2.9 UL	2.9 UL	2.9 U	3 U	4.1 U	2.9 U	0.55 U	0.55 U	0.56 U
Iron	5,590	4,170	2,860	3,120 J	11,000	7,110 J	3,010 J	7,370	7,300	3,660
Lead	8.4	10.4	5.2	29.2	344	11.2	5	8.9	11.8	17.1
Magnesium	486	277	220	288	617	639	232	694	555	376 J
Manganese	61.9	171	82.1	20.2 J	38.5	73.3 J	39.3 J	125	51.8	64.4
Mercury	0.1 UL	0.12 UL	0.12 UL	0.1 UL	1.3	0.16 UL	0.1 UL	0.023 J	0.093	0.25
Nickel	3.7	4.4	2.3	1.5	17.8	3.6	2	5.1	3.8	2.6
Potassium	383	265 B	271 B	235	559	493	248	753	765	403 J
Selenium	0.56 U	0.59 U	0.62 K	0.58 U	0.62 U	0.84 U	0.59 U	0.56 U	0.55 U	0.56 U
Silver	0.43 U	0.46 U	0.46 U	0.44 U	8.8	0.65 U	0.45 U	0.56 U	0.55 U	3.3
Sodium	31.6	74.6	68.5	23.9	85.4	110	23.7	184 J	177 J	82.7 J
Thallium	0.87 UL	0.91 UL	0.93 UL	0.89 U	0.95 UL	1.3 U	0.91 U	1.1 U	1.1 U	1.1 U
Vanadium	12.9	9.7	6.4	8.5	18.9	17.1	6.5	14.9	18.3	11.6
Zinc	11.1 J	17.6 J	8.2 J	12.2 J	1,190	35 J	7.9 J	27.2	25.3	29.9
Wet Chemistry										
pH (ph)	NA	NA	NA	NA	NA	NA	NA	6	6.58	5.2
Total organic carbon (TOC) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	15,080	10,830	8,444
Grain Size (pct/p)										
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	NA	NA	NA	98.2	98.1	99.8
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	NA	NA	NA	86.5	87.1	97.6
Sieve No. 020 (850 um)	NA	NA	NA	NA	NA	NA	NA	69.3	72.9	89.6
Sieve No. 040 (425 um)	NA	NA	NA	NA	NA	NA	NA	54.8	58.5	77.6
Sieve No. 060 (250 um)	NA	NA	NA	NA	NA	NA	NA	30	37.4	54
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	15.2	17.7	28.1
Sieve No. 100 (150 um)	NA	NA	NA	NA	NA	NA	NA	12.3	14	21.8
Sieve No. 230 (63-UM)	NA	NA	NA	NA	NA	NA	NA	1.9	2.7	3.5
Sieve No. 200 (75 um)	NA	NA	NA	NA	NA	NA	NA	2.5	3.8	6.2

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

pct/p - Percent Passed

ph - pH units

µg/kg - Micrograms per kilogram

CTO-205
Yorktown - Site 24
Validated Surface Soil Raw Analytical Results

Station ID	24SS01	24SS05	A06SS07	A06SS09	A06SS10	A06SS11	A06SS12		A06SS13	A06SS14	A06SS15	A06SS16	A06SS17	YS24-SO01		YS24-SO02	YS24-SO03	YS24-GW/SO04
Sample ID	24SS01	24SS05	A06SS07-00	A06SS09-00	A06SS10-00	A06SS11-00	A06SS12-00	A06SS12-00D	A06SS13-00	A06SS14-00	A06SS15-00	A06SS16-00	A06SS17-00	YS24-SS01-0410	YS24-SS01P-0410	YS24-SS02-0410	YS24-SS03-0410	YS24-SS04-0410
Sample Date	09/09/97	09/09/97	11/06/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10
Chemical Name																		
Volatile Organic Compounds (µg/kg)																		
1,1,1-Trichloroethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,1,2,2-Tetrachloroethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,1,2-Trichloroethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,1-Dichloroethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,1-Dichloroethene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,2,4-Trichlorobenzene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
1,2-Dichlorobenzene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
1,2-Dichloroethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,2-Dichloroethene (total)	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	NA	NA	NA	NA	NA
1,2-Dichloropropane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
1,3-Dichlorobenzene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
1,4-Dichlorobenzene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	52 J	350 U	360 U	370 U	370 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
2-Butanone	11 U	10 U	12 U	11 U	11 R	12 U	11 R	4 J	11 R	11 R	11 R	11 R	11 U	9 K	10 K	39 J	11	3.1 B
2-Hexanone	11 U	10 U	12 U	11 U	11 UJ	12 U	11 UJ	12 UJ	11 UJ	11 UJ	11 UJ	11 UJ	11 U	8.4 U	12 U	12 UJ	9.4 U	9.5 U
4-Methyl-2-pentanone	11 U	10 U	12 U	11 U	11 UJ	12 U	11 UJ	12 UJ	11 UJ	11 UJ	11 UJ	11 UJ	11 U	8.4 U	12 U	12 UJ	9.4 U	9.5 U
Acetone	11 U	10 U	12 U	11 U	11 U	12 U	3 J	12 U	11 U	11 U	11 U	11 U	11 U	82 B	100 B	340 B	130 B	33 B
Benzene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Bromodichloromethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Bromoform	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
Bromomethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Carbon disulfide	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	0.71 J
Carbon tetrachloride	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Chlorobenzene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	1 J	11 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
Chloroethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Chloroform	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Chloromethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
cis-1,3-Dichloropropene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Dibromochloromethane	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Ethylbenzene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.7 U	9.8 U	9.6 UJ	7.5 U	7.6 U
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	120 K	59 K	160 J	2,100 J	3.8 U
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Methylene chloride	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	0.51 B	0.53 B	4.8 UJ	3.8 U	0.39 B
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Styrene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
Tetrachloroethene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
Toluene	1 J	10 U	12 U	11 U	11 U	1 J	11 U	12 U	11 U	11 U	11 U	1 J	11 U	0.49 B	0.42 B	4.8 UJ	0.69 B	0.52 B
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
trans-1,3-Dichloropropene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Trichloroethene	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 UL	3.8 U
Trichlorofluoromethane(Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Vinyl chloride	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Xylene, total	11 U	10 U	12 U	11 U	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	3.4 U	4.9 U	4.8 UJ	3.8 U	3.8 U
Semivolatile Organic Compounds (µg/kg)																		
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190 U	190 U	190 U	190 U	190 U
2,2'-Oxybis(1-chloropropane)	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	NA	NA	NA	NA	NA	190 U	190 U	190 U	190 U	190 U
2,4,5-Trichlorophenol	850 U	830 U	940 U	900 U	880 U	930 U	910 U	910 U	870 U	860 U	880 U	900 U	900 U	370 U	370 U	360 U	370 U	380 U
2,4,6-Trichlorophenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	370 U	370 U	360 U	370 U	380 U
2,4-Dichlorophenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	370 UL	370 UL	360 UL	370 UL	380 U
2,4-Dimethylphenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	370 U	370 U	360 U	370 U	380 U

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Station ID	24SS01	24SS05	A06SS07	A06SS09	A06SS10	A06SS11	A06SS12		A06SS13	A06SS14	A06SS15	A06SS16	A06SS17	YS24-SO01		YS24-SO02	YS24-SO03	YS24-GW/SO04
Sample ID	24SS01	24SS05	A06SS07-00	A06SS09-00	A06SS10-00	A06SS11-00	A06SS12-00	A06SS12-00D	A06SS13-00	A06SS14-00	A06SS15-00	A06SS16-00	A06SS17-00	YS24-SS01-0410	YS24-SS01P-0410	YS24-SS02-0410	YS24-SS03-0410	YS24-SS04-0410
Sample Date	09/09/97	09/09/97	11/06/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10
Chemical Name																		
2,4-Dinitrophenol	850 UJ	830 UJ	940 U	900 U	880 U	930 U	910 U	910 U	870 U	860 U	880 U	900 U	900 U	370 U	370 U	360 U	370 U	380 U
2,4-Dinitrotoluene	250 U	250 U	260 U	260 U	260 U	260 U	260 U	260 U	360 U	350 U	360 U	370 U	370 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	360 U	350 U	360 U	370 U	370 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
2-Chlorophenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	370 U	370 U	360 U	370 U	380 U
2-Methylnaphthalene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
2-Methylphenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	370 U	370 U	360 U	370 U	380 U
2-Nitroaniline	850 U	830 U	940 U	900 U	880 U	930 U	910 U	910 U	870 U	860 U	880 U	900 U	900 U	190 U	190 U	190 U	190 U	190 U
2-Nitrophenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	370 U	370 U	360 U	370 U	380 U
3,3'-Dichlorobenzidine	350 U	340 U	390 U	370 U	360 UJ	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
3-Nitroaniline	850 U	830 U	940 U	900 U	880 U	930 U	910 U	910 U	870 U	860 U	880 U	900 U	900 U	370 U	370 U	360 U	190 U	380 U
4,6-Dinitro-2-methylphenol	850 U	830 U	940 U	900 U	880 U	930 U	910 U	910 U	870 U	860 U	880 U	900 U	900 U	370 U	370 U	360 U	370 U	380 U
4-Bromophenyl-phenylether	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
4-Chloro-3-methylphenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	370 U	370 U	360 U	370 U	380 U
4-Chloroaniline	350 U	340 U	390 U	370 UJ	360 UJ	180 J	370 U	370 U	360 U	350 U	360 UJ	370 U	370 U	370 U	370 U	360 U	190 U	380 U
4-Chlorophenyl-phenylether	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
4-Methylphenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	280 UL	280 UL	270 UL	280 UL	280 U
4-Nitroaniline	850 U	830 U	940 U	900 U	880 U	930 U	910 U	910 U	870 U	860 U	880 U	900 U	900 U	370 U	370 U	360 U	190 U	380 U
4-Nitrophenol	850 U	830 U	940 U	900 U	880 U	930 U	910 U	910 U	870 U	860 U	880 U	900 U	900 U	370 U	370 U	360 U	370 U	380 U
Acenaphthene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Acenaphthylene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190 U	190 U	190 U	94 U	190 U
Anthracene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190 U	190 U	190 U	94 U	190 U
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190 U	190 U	29 J	94 U	190 U
Benzo(a)anthracene	350 U	340 U	390 U	40 J	360 U	59 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	47 J
Benzo(a)pyrene	350 U	340 U	390 U	140 J	360 U	90 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	50 J
Benzo(b)fluoranthene	350 U	340 U	390 U	46 J	360 U	150 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	94 J
Benzo(g,h,i)perylene	350 U	340 U	390 U	870 J	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	30 J	190 U	43 J
Benzo(k)fluoranthene	350 U	340 U	390 U	50 J	360 U	100 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	100 J
bis(2-Chloroethoxy)methane	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
bis(2-Chloroethyl)ether	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
bis(2-Chloroisopropyl)ether	NA	NA	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	350 U	340 U	390 U	50 J	360 U	3,600	370 U	540	360 U	350 U	360 U	370 U	370 U	190 U	230	190 U	190 U	190 U
Butylbenzylphthalate	350 U	340 U	390 U	370 U	360 U	270 J	370 U	780	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190 U	190 U	190 U	94 U	190 U
Carbazole	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Chrysene	350 U	340 U	390 U	58 J	360 U	94 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	91 J
Dibenz(a,h)anthracene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Dibenzofuran	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Diethylphthalate	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Dimethyl phthalate	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Di-n-butylphthalate	350 U	340 U	1,100	440	2,300	2,500	1,000	4,600	2,600	760	200 J	68 J	2,500	190 U	190 U	190 U	190 U	25 J
Di-n-octylphthalate	350 U	340 U	390 U	370 U	360 U	98 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	450	190 U	190 U	190 U
Fluoranthene	350 U	340 U	390 U	100 J	360 U	88 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	23 J	190 U	74 J
Fluorene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Hexachlorobenzene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Hexachlorobutadiene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 UJ	370 U	190 U	190 U	190 U	190 U	190 U
Hexachlorocyclopentadiene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Hexachloroethane	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Indeno(1,2,3-cd)pyrene	350 U	340 U	390 U	63 J	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Isophorone	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Naphthalene	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
n-Nitroso-di-n-propylamine	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
n-Nitrosodiphenylamine	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Nitrobenzene	250 U	250 U	260 U	260 U	260 U	260 U	260 U	260 U	360 U	350 U	360 U	370 U	370 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Pentachlorophenol	850 U	830 U	940 U	900 U	880 U	930 U	910 U	910 U	870 U	350 U	880 U	900 U	900 U	370 U	370 U	360 U	370 U	380 U
Phenanthrene	350 U	340 U	390 U	80 J	360 U	64 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	190 U	190 U	190 U
Phenol	350 U	340 U	390 U	370 U	360 U	380 U	370 U	370 U	360 U	350 U	360 U	370 U	370 U	370 U	370 U	360 U	370 U	380 U
Pyrene	350 U	340 U	390 U	240 J	360 U	100 J	370 U	370 U	360 U	350 U	360 U	370 U	370 U	190 U	190 U	35 J	190 U	73 J

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Yorktown - Site 24
Validated Surface Soil Raw Analytical Results

Station ID	24SS01	24SS05	A06SS07	A06SS09	A06SS10	A06SS11	A06SS12		A06SS13	A06SS14	A06SS15	A06SS16	A06SS17	YS24-SO01		YS24-SO02	YS24-SO03	YS24-GW/SO04
Sample ID	24SS01	24SS05	A06SS07-00	A06SS09-00	A06SS10-00	A06SS11-00	A06SS12-00	A06SS12-00D	A06SS13-00	A06SS14-00	A06SS15-00	A06SS16-00	A06SS17-00	YS24-SS01-0410	YS24-SS01P-0410	YS24-SS02-0410	YS24-SS03-0410	YS24-SS04-0410
Sample Date	09/09/97	09/09/97	11/06/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10
Chemical Name																		
Pesticide/Polychlorinated Biphenyls (µg/kg)																		
4,4'-DDD	3.6 U	0.54 J	3.9 UJ	3.7 U	3.6 U	35	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	3.6 UL	3.7 U	3.8 UJ
4,4'-DDE	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	11 J	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	1.1 J	3.7 U	3.8 UJ
4,4'-DDT	0.61 B	0.58 B	3.9 UJ	3.7 U	3.6 U	29	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	1.5 J	1.4 J	2.9 J	3.7 U	0.59 J
Aldrin	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL	1.9 U	1.9 UJ
alpha-BHC	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL	1.9 U	1.9 UJ
alpha-Chlordane	1.8 U	0.49 J	2 UJ	1.9 U	1.9 U	74 J	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	0.32 J	0.25 J	0.5 J	1.9 U	1.9 UJ
Aroclor-1016	36 U	35 U	39 UJ	37 U	36 U	190 U	37 U	37 U	36 U	35 U	36 U	37 U	37 U	27 U	27 U	26 U	27 U	27 UJ
Aroclor-1221	71 U	69 U	79 UJ	75 U	73 U	390 U	76 U	76 U	73 U	72 U	74 U	75 U	75 U	38 U	38 U	37 U	38 U	39 UJ
Aroclor-1232	36 U	35 U	39 UJ	37 U	36 U	190 U	37 U	37 U	36 U	35 U	36 U	37 U	37 U	19 U	19 U	19 U	19 U	19 UJ
Aroclor-1242	36 U	35 U	39 UJ	37 U	36 U	190 U	37 U	37 U	36 U	35 U	36 U	37 U	37 U	19 U	19 U	19 U	19 U	19 UJ
Aroclor-1248	36 U	35 U	39 UJ	37 U	36 U	190 U	37 U	37 U	36 U	35 U	36 U	37 U	37 U	19 U	19 U	19 U	19 U	19 UJ
Aroclor-1254	36 U	35 U	39 UJ	37 U	36 U	190 U	37 U	37 U	36 U	35 U	36 U	37 U	37 U	19 U	19 U	19 U	19 U	19 UJ
Aroclor-1260	36 U	35 U	39 UJ	37 U	36 U	190 U	37 U	37 U	36 U	35 U	36 U	37 U	37 U	19 U	19 U	19 U	19 U	19 UJ
beta-BHC	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	0.96 U	0.95 UL	0.94 UL	1.9 U	1.9 UJ
delta-BHC	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL	1.9 U	1.9 UJ
Dieldrin	0.59 J	3.5 U	3.9 UJ	3.7 U	3.6 U	6.6 J	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	3.6 UL	3.7 U	3.8 UJ
Endosulfan I	0.38 J	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL	1.9 U	1.9 UJ
Endosulfan II	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	0.52 L	3.7 U	3.8 UJ
Endosulfan sulfate	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	1.5 J	3.7 U	3.8 UJ
Endrin	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	0.41 J	0.38 J	3.6 UL	3.7 U	3.8 UJ
Endrin aldehyde	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	3.6 UL	0.42 J	3.8 UJ
Endrin ketone	3.6 U	3.5 U	3.9 UJ	3.7 U	3.6 U	19 U	3.7 U	3.7 U	3.6 U	3.5 U	3.6 U	3.7 U	3.7 U	3.7 U	3.7 UL	1.4 J	3.7 U	3.8 UJ
gamma-BHC (Lindane)	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	1.9 UL	1.9 U	1.9 UJ
gamma-Chlordane	1.8 U	0.5 J	2 UJ	1.9 U	1.9 U	76	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	0.22 J	0.3 J	0.68 J	1.9 U	1.9 UJ
Heptachlor	1.8 U	1.7 U	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	0.23 J	0.24 J	1.9 U	1.9 UJ
Heptachlor epoxide	1.8 U	0.18 J	2 UJ	1.9 U	1.9 U	9.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 UL	0.49 L	1.9 U	1.9 UJ
Methoxychlor	18 U	17 U	20 UJ	19 U	19 U	99 U	19 U	19 U	18 U	18 U	19 U	19 U	19 U	19 U	19 UL	4.8 J	19 U	19 UJ
Toxaphene	180 U	170 U	200 UJ	190 U	190 U	990 U	190 U	190 U	180 U	180 U	190 U	190 U	190 U	93 U	92 UL	91 UL	92 U	94 UJ
Explosives (µg/kg)																		
1,3,5-Trinitrobenzene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 UL	1,500 UL
1,3-Dinitrobenzene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2,4,6-Trinitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Amino-4,6-dinitrotoluene	250 U	250 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Nitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	NA	NA	NA	NA	NA	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
3-Nitrotoluene	250 U	250 U	220 U	220 U	220 U	220 U	220 U	220 U	NA	NA	NA	NA	NA	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
4-Amino-2,6-dinitrotoluene	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
4-Nitrotoluene	250 U	250 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
HMX	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
RDX	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	NA	NA	NA	NA	NA	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Tetryl	650 U	650 U	650 U	650 U	650 U	650 U	650 U	650 U	NA	NA	NA	NA	NA	3,000 U	3,000 U	3,000 U	3,000 R	3,000 U
Total Metals (mg/kg)																		
Aluminum	7,500 J	4,250 J	6,040	6,330	6,890	4,180	4,870	4,670	2,290	1,760	5,390	5,650	4,210	7,100	6,740	5,770	3,100	7,600
Antimony	0.81 UL	0.79 UL	2.8 UL	2.7 UL	2.7 UL	2.8 UL	2.7 UL	2.7 UL	2.6 UL	2.6 UL	2.7 UL	2.6 UL	2.7 UL	0.48 J	0.4 J	0.88 J	1.1 UL	1.1 J
Arsenic	3.4	1 J	2.8	2.1	1.4	2	1.2	1.2	0.64	0.88	1.2	1.7	1.2	3.1	2.1	1.8	1.1 U	70.4
Barium	31.6 J	32.4 J	32	51.3	34.4	46.8	42.6	39.1	22.9	16.3	33.8	37.2	44	40.4	39.9	31.9	13.6 J	31.4
Beryllium	0.09 J	0.14 J	0.19	0.32	0.17 K	0.09 K	0.32	0.3	0.07	0.08	0.26 K	0.31 K	0.26	0.47 J	0.33 J	0.31 J	0.09 B	0.46 J
Cadmium	0.15 B	0.17 B	0.34 U	0.9 K	0.33 U	0.61	0.34 U	0.41 K	0.31 U	0.37 K	0.33 U	0.32 U	4.3	0.31 J	0.27 J	0.49 J	0.56 U	1.1
Calcium	3,120 J	430 J	824	398	419	210	274	269	226	135	221	117	175	780	745	580	209 J	16,100
Chromium	16.5 J	5.9 J	9.5	5.8	6.2	7.7	4	5.2	2.9	2.5	4.7	4.5	3.4	12.2	9.6	10	3.5	14.8
Cobalt	2.1 J	3.5 J	1.4	2	1.8	0.86	1.3	1.6	0.79	0.85	2.8	2.6	3.8	1.9	1.7	1.9	0.66	2.9
Copper	7.2	26.4	3.3 B	4.3	1.9	139	2.9 B	3.8	1.5 B	1.3 B	9.8	3.5	1.4 B	6.2	5.7	5.5	1.3	4.7
Cyanide	0.14 L	2.1 UL	2.9 UL	2.8 UL	2.8 U	2.9 U	2.8 UL	2.8 UL	2.7 L	2.7 UL	2.7 U	2.8 U	2.8 UL	0.55 U	0.53 U	0.53 U	0.56 U	0.55 U
Iron	8,880	3,360	5,640	3,970	3,650	3,180	2,300	2,510	1,510	1,580	2,980	2,930	2,520	7,710	6,190	8,470	2,250	11,000
Lead	10.9	11.9	7	22.8	6.1	34.6	6.2	7.1	4.4	3.3	11.1	7.6	4.1	21.2	14.3	38.9	5.1 K	15
Magnesium	878 J	296 J	400	276	435	342	254	259	176	133	303	311	204	500 J	473 J	383 J	269 J	1,100
Manganese	65.1	93.8	39	77.9	42.9	19.3	145	139	27.6	22.3	60.4	143	73.6	90.3	83.1	114	36.7 K	90.7
Mercury	0.07 J	0.09 J	0.1 UL	0.09 UL	0.09 UL	4.7	0.1 UL	0.1 UL	0.09 UL	0.1 UL	0.11 UL	0.1 UL	0.11 UL	0.065	0.072	0.062	0.037 U	0.025 J
Nickel	4.7 J	3.9 J	2	4.3	2.3	1.2	2.8	3.4	1.4	1.3	3.2	3.4	4.9	4	4.1	5	1.5	5.1

CTO-205
Yorktown - Site 24
Validated Surface Soil Raw Analytical Results

Station ID	24SS01	24SS05	A06SS07	A06SS09	A06SS10	A06SS11	A06SS12		A06SS13	A06SS14	A06SS15	A06SS16	A06SS17	YS24-SO01		YS24-SO02	YS24-SO03	YS24-GW/SO04
Sample ID	24SS01	24SS05	A06SS07-00	A06SS09-00	A06SS10-00	A06SS11-00	A06SS12-00	A06SS12-00D	A06SS13-00	A06SS14-00	A06SS15-00	A06SS16-00	A06SS17-00	YS24-SS01-0410	YS24-SS01P-0410	YS24-SS02-0410	YS24-SS03-0410	YS24-SS04-0410
Sample Date	09/09/97	09/09/97	11/06/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	11/07/94	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10
Chemical Name																		
Potassium	821 J	249 J	538	280 B	305	181	294 B	293 B	240 B	189 B	247	241	198 B	589	515 J	365 J	151 J	1,630
Selenium	0.87 U	0.85 U	0.59 U	0.58 U	0.57 U	0.66 K	0.78 K	0.59 U	0.54 U	0.58 K	0.57 U	0.56 U	0.58 U	0.56 U	0.55 U	0.55 U	0.56 U	0.56 U
Silver	0.21 U	0.21 U	0.45 U	0.45 U	0.44 U	8.1	0.45 U	0.45 U	0.42 U	0.42 U	0.44 U	0.43 U	0.45 U	0.56 U	0.55 U	0.55 U	0.56 U	0.56 U
Sodium	47.3 U	46.1 U	71.2	23.8	32.9	77.3	78.4	68.2	73.7	25.8	23.9	22.9	27.9	165 J	169 J	176 J	107 J	226 J
Thallium	1.3 U	1.2 U	0.9 UL	0.89 UL	0.88 UL	0.92 UL	0.9 UL	0.9 UL	0.84 UL	0.85 UL	0.87 UL	0.86 UL	0.9 UL	1.1 U	1.1 U	1.1 U	1.1 UL	1.1 U
Vanadium	21.1	10.7	13.2	9	10.3	13.1	5	5.5	4.1	3.7	6.7	6	4.9	19.6	17.8	34.3	8.4	17.6
Zinc	31.2 K	42.3	11.3 J	28.1 J	22.9 J	13.1 J	13.2 J	15.1 J	4.9 J	9.7 J	68.3 J	24.7 J	27.4 J	22.6	22	39.3	7.6	23.2
Wet Chemistry																		
Cation Exchange Capacity (MEQ/100G) (mg/kg)	8,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	6.4	NA	NA	NA	NA	NA	NA	NA	5.67	5.34	5.67	4.93	5.53	5.75	NA	5.26	5.22	7.99
Total organic carbon (TOC) (mg/kg)	29,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10,790	NA	28,410	11,380	10,620
Geotechnical (g/cc)																		
Density	1.31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size (pct/p)																		
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	77.4	92.3	99.6	99.7	76
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	63.9	79.5	88.4	96.2	61
Sieve No. 020 (850 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50.3	46.9	61.5	87.1	40.4
Sieve No. 040 (425 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	35.6	25.6	43.4	72.7	25.1
Sieve No. 060 (250 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18.4	10.5	26.2	52.2	16.6
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8	5.6	16.5	30.3	10.8
Sieve No. 100 (150 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.1	4.5	14.2	24	9.3
Sieve No. 230 (63-UM)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.9	0.7	1.5	6.9	0.7
Sieve No. 200 (75 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.5	0.9	2.2	9	1.1

Notes:

Shading indicates detections
B - Analyte not detected above the level reported in associated 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
NA - Not analyzed
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
g/cc - Grams per cubic centimeter
mg/kg - Milligrams per kilogram
pct/p - Percent Passed
ph - pH units
µg/kg - Micrograms per kilogram

Station ID	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-SS11		YS24-SS12	YS24-SS13	YS24-SS16	YS24-SS17	YS24-SS18	YS24-SS19	YS24-SS21
Sample ID	YS24-SS05-0410	YS24-SS06-0410	YS24-SS07-0410	YS24-SS08-0410	YS24-SS11-0410	YS24-SS11P-0410	YS24-SS12-0410	YS24-SS13-0410	YS24-SS16-0410	YS24-SS17-0410	YS24-SS18-0410	YS24-SS19-0410	YS24-SS21-0410
Sample Date	04/15/10	04/15/10	04/19/10	04/15/10	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10	04/15/10	04/15/10	04/15/10	04/16/10
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,1,1-Trichloroethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,1,2,2-Tetrachloroethane	3 UJ	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,1,2-Trichloroethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,1-Dichloroethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,1-Dichloroethene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,2,4-Trichlorobenzene	3 UJ	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 UL	4.4 U	4.4 U	4.1 U
1,2-Dibromo-3-chloropropane	3 UJ	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,2-Dibromoethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,2-Dichlorobenzene	3 UJ	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 UL	4.4 U	4.4 U	4.1 U
1,2-Dichloroethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
1,3-Dichlorobenzene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 UL	4.4 U	4.4 U	4.1 U
1,4-Dichlorobenzene	3 UJ	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 UL	4.4 U	4.4 U	4.1 U
2-Butanone	7.5 U	2.8 B	8.4 K	2.5 B	11	11 J	16 K	10 K	9.4 B	13 B	11 B	6.7 B	10 J
2-Hexanone	7.5 U	9 U	9.4 U	9.6 U	8 U	16 U	11 U	10 U	7.6 U	11 U	11 U	11 U	10 U
4-Methyl-2-pentanone	7.5 U	9 U	9.4 U	9.6 U	8 U	16 U	11 U	10 U	7.6 U	11 U	11 U	11 U	10 U
Acetone	19 B	33 B	98 B	19 B	250 B	270 B	150 B	160 B	160 B	130 B	130 B	160 B	120 B
Benzene	0.2 K	3.6 U	3.8 U	0.24 J	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Bromodichloromethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Bromoform	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Bromomethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Carbon disulfide	0.99 K	3.8 K	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Carbon tetrachloride	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Chlorobenzene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Chloroethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Chloroform	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Chloromethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
cis-1,2-Dichloroethene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
cis-1,3-Dichloropropene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Cyclohexane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Dibromochloromethane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Dichlorodifluoromethane (Freon-12)	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Ethylbenzene	1.6 K	3.6 U	3.8 U	5	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Isopropylbenzene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 UL	4.4 U	4.4 U	4.1 U
m- and p-Xylene	6 U	7.2 U	7.5 U	7.7 U	6.4 U	13 U	8.8 U	8 U	6.1 U	8.7 U	8.8 U	8.9 U	8.2 U
Methyl acetate	3 U	16 K	13 K	3.8 U	9.2	21	29	7 K	3.2 B	7.7 J	5.7 B	2 B	4.4
Methylcyclohexane	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Methylene chloride	3 U	3.6 U	3.8 U	3.8 U	0.63 B	6.6 U	4.4 U	4 U	0.32 B	0.44 B	4.4 U	0.78 B	0.91 B
Methyl-tert-butyl ether (MTBE)	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
o-Xylene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Styrene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Tetrachloroethene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Toluene	1.1 B	0.55 B	3.8 U	1.9 B	0.35 B	1.1 B	4.4 U	4 U	0.48 B	4.4 U	0.49 B	3.6 B	0.36 B
trans-1,2-Dichloroethene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
trans-1,3-Dichloropropene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Trichloroethene	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 UL	4.4 U	4.4 U	4.1 U
Trichlorofluoromethane(Freon-11)	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Vinyl chloride	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Xylene, total	3 U	3.6 U	3.8 U	3.8 U	3.2 U	6.6 U	4.4 U	4 U	3.1 U	4.4 U	4.4 U	4.4 U	4.1 U
Semivolatile Organic Compounds (µg/kg)													
1,1-Biphenyl	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
2,2'-Oxybis(1-chloropropane)	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
2,4,5-Trichlorophenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
2,4,6-Trichlorophenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
2,4-Dichlorophenol	380 U	400 U	380 UL	380 UL	360 UL	440 UL	380 UL	370 UL	370 U	380 U	390 U	370 U	380 UL
2,4-Dimethylphenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U

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Validated Surface Soil Raw Analytical Results

Station ID	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-SS11		YS24-SS12	YS24-SS13	YS24-SS16	YS24-SS17	YS24-SS18	YS24-SS19	YS24-SS21
Sample ID	YS24-SS05-0410	YS24-SS06-0410	YS24-SS07-0410	YS24-SS08-0410	YS24-SS11-0410	YS24-SS11P-0410	YS24-SS12-0410	YS24-SS13-0410	YS24-SS16-0410	YS24-SS17-0410	YS24-SS18-0410	YS24-SS19-0410	YS24-SS21-0410
Sample Date	04/15/10	04/15/10	04/19/10	04/15/10	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10	04/15/10	04/15/10	04/15/10	04/16/10
Chemical Name													
2,4-Dinitrophenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
2,4-Dinitrotoluene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500	1,500 U	1,500 U	1,500 U
2,6-Dinitrotoluene	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
2-Chloronaphthalene	190 U	200 U	190 U	200 U	66 J	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
2-Chlorophenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
2-Methylnaphthalene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
2-Methylphenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
2-Nitroaniline	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
2-Nitrophenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
3,3'-Dichlorobenzidine	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
3-Nitroaniline	380 U	400 U	380 U	380 U	360 UJ	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
4,6-Dinitro-2-methylphenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
4-Bromophenyl-phenylether	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
4-Chloro-3-methylphenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
4-Chloroaniline	380 U	400 U	380 U	380 U	360 UJ	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
4-Chlorophenyl-phenylether	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
4-Methylphenol	280 U	300 U	280 UL	290 UL	270 UL	340 UL	280 UL	280 UL	280 U	290 U	290 U	280 U	290 UL
4-Nitroaniline	380 U	400 U	380 U	380 U	360 UJ	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
4-Nitrophenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
Acenaphthene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Acenaphthylene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Acetophenone	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Anthracene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Atrazine	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Benzaldehyde	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Benzo(a)anthracene	190 U	64 J	190 U	66 J	190 UJ	230 U	190 U	190 U	190 U	200 U	34 J	38 J	200 U
Benzo(a)pyrene	190 U	70 J	190 U	63 J	190 UJ	230 U	190 U	190 U	190 U	22 J	35 J	47 J	200 U
Benzo(b)fluoranthene	190 U	110 J	32 J	53 J	190 UJ	230 U	190 U	190 U	190 U	23 K	36 J	62 J	200 U
Benzo(g,h,i)perylene	190 U	59 J	190 U	48 J	190 UJ	230 U	190 U	190 U	190 U	200 U	27 J	36 J	200 U
Benzo(k)fluoranthene	190 U	87 J	31 J	70 J	190 UJ	230 U	190 U	190 U	190 U	200 U	40 J	56 J	200 U
bis(2-Chloroethoxy)methane	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
bis(2-Chloroethyl)ether	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200
Butylbenzylphthalate	190 U	200 U	44 J	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Caprolactam	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Carbazole	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Chrysene	190 U	100 J	33 J	74 J	190 UJ	230 U	190 U	190 U	190 U	200 U	38 J	61 J	200 U
Dibenz(a,h)anthracene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Dibenzofuran	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Diethylphthalate	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Dimethyl phthalate	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Di-n-butylphthalate	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Di-n-octylphthalate	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Fluoranthene	30 J	150 J	36 J	140 J	190 UJ	230 U	190 U	190 U	190 U	48 J	53 J	73 J	200 U
Fluorene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Hexachlorobenzene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Hexachlorobutadiene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Hexachlorocyclopentadiene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Hexachloroethane	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Indeno(1,2,3-cd)pyrene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Isophorone	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Naphthalene	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
n-Nitroso-di-n-propylamine	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
n-Nitrosodiphenylamine	190 U	200 U	190 U	200 U	190 UJ	230 U	190 U	190 U	190 U	200 U	200 U	190 U	200 U
Nitrobenzene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Pentachlorophenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
Phenanthrene	190 U	38 J	34 J	88 J	190 UJ	230 U	190 U	190 U	190 U	49 J	33 J	34 J	200 U
Phenol	380 U	400 U	380 U	380 U	360 U	440 U	380 U	370 U	370 U	380 U	390 U	370 U	380 U
Pyrene	34 J	130 J	49 J	120 J	190 UJ	230 U	190 U	190 U	190 U	44 J	75 J	82 J	200 U

CTO-205
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Validated Surface Soil Raw Analytical Results

Station ID	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-SS11		YS24-SS12	YS24-SS13	YS24-SS16	YS24-SS17	YS24-SS18	YS24-SS19	YS24-SS21
Sample ID	YS24-SS05-0410	YS24-SS06-0410	YS24-SS07-0410	YS24-SS08-0410	YS24-SS11-0410	YS24-SS11P-0410	YS24-SS12-0410	YS24-SS13-0410	YS24-SS16-0410	YS24-SS17-0410	YS24-SS18-0410	YS24-SS19-0410	YS24-SS21-0410
Sample Date	04/15/10	04/15/10	04/19/10	04/15/10	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10	04/15/10	04/15/10	04/15/10	04/16/10
Chemical Name													
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	3.8 UJ	0.78 J	3.8 U	3.8 U	3.6 U	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
4,4'-DDE	0.41 J	1.2 J	1 J	3.8 U	0.66 J	0.59 L	3.8 UL	0.93 L	0.56 J	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
4,4'-DDT	3.8 UJ	0.98 J	0.58 J	3.8 U	0.58 J	4.5 UL	3.8 UL	2.5 L	0.69 J	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
Aldrin	1.9 UJ	2 UJ	0.47 J	2 U	0.27 J	0.42 J	1.9 UL	0.26 J	1.9 UJ	2 UJ	2 UJ	1.9 UJ	2 UL
alpha-BHC	1.9 UJ	2 UJ	1.9 U	2 U	1.8 U	2.3 UL	1.9 UL	1.9 UL	0.71 J	2 UJ	2 UJ	1.9 UJ	2 UL
alpha-Chlordane	1.9 UJ	2 UJ	2.5	2 U	0.18 J	2.3 UL	1.9 UL	1.9 UL	0.43 J	2 UJ	2 UJ	1.9 UJ	0.43 J
Aroclor-1016	27 UJ	29 UJ	27 U	28 U	26 U	32 U	27 U	27 U	27 UJ	28 UJ	28 UJ	27 UJ	28 U
Aroclor-1221	39 UJ	41 UJ	39 U	40 U	37 U	46 U	39 U	38 U	38 UJ	39 UJ	40 UJ	38 UJ	39 U
Aroclor-1232	19 UJ	20 UJ	19 U	20 U	18 U	23 U	19 U	19 U	19 UJ	20 UJ	20 UJ	19 UJ	20 U
Aroclor-1242	19 UJ	20 UJ	19 U	20 U	18 U	23 U	19 U	19 U	19 UJ	20 UJ	20 UJ	19 UJ	20 U
Aroclor-1248	19 UJ	20 UJ	19 U	20 U	18 U	23 U	19 U	19 U	19 UJ	20 UJ	20 UJ	19 UJ	20 U
Aroclor-1254	19 UJ	20 UJ	19 U	20 U	18 U	23 U	19 U	19 U	19 UJ	20 UJ	20 UJ	19 UJ	20 U
Aroclor-1260	19 UJ	20 UJ	19 U	20 U	18 U	23 U	19 U	19 U	19 UJ	20 UJ	20 UJ	19 UJ	20 U
beta-BHC	1.9 UJ	2 UJ	1.9 U	0.99 U	0.93 U	1.2 UL	0.77 J	0.96 UL	1.9 UJ	2 UJ	0.99 J	1.9 UJ	0.99 J
delta-BHC	1.9 UJ	2 UJ	0.36 J	2 U	0.27 J	0.44 J	1.9 UL	1.9 UL	0.48 J	0.2 J	2 UJ	0.34 J	2 UL
Dieldrin	3.8 UJ	4 UJ	3.8 U	3.8 U	3.6 U	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
Endosulfan I	1.9 UJ	2 UJ	1.9 U	2 U	1.8 U	2.3 UL	1.9 UL	1.9 UL	0.21 J	2 UJ	0.2 J	1.9 UJ	2 UL
Endosulfan II	3.8 UJ	4 UJ	3.8 U	3.8 U	3.6 U	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
Endosulfan sulfate	3.8 UJ	4 UJ	3.8 U	3.8 U	0.42 J	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	0.38 J	3.8 UL
Endrin	3.8 UJ	4 UJ	3.8 U	3.8 U	0.49 J	4.5 UL	3.8 UL	3.7 UL	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
Endrin aldehyde	0.42 J	4 UJ	0.7 L	3.8 U	0.52 J	4.5 UL	3.8 UL	3.7 UL	0.97 J	3.8 UJ	3.9 UJ	3.7 UJ	0.46 J
Endrin ketone	3.8 UJ	4 UJ	3.8 U	3.8 U	0.81 J	0.81 L	3.8 UL	0.44 J	3.7 UJ	3.8 UJ	3.9 UJ	3.7 UJ	3.8 UL
gamma-BHC (Lindane)	1.9 UJ	2 UJ	1.9 U	2 U	1.8 U	2.3 UL	1.9 UL	1.9 UL	0.98 J	0.68 J	1.1 J	0.28 J	2 UL
gamma-Chlordane	1.9 UJ	2 UJ	0.44 J	2 U	0.21 J	0.37 J	1.9 UL	1.9 UL	1 J	2 UJ	0.24 J	1.9 UJ	2 UL
Heptachlor	1.9 UJ	2 UJ	1.9 U	2 U	0.46 J	0.94 L	1.9 UL	1.9 UL	0.35 J	2 UJ	2 UJ	1.9 UJ	2 UL
Heptachlor epoxide	1.9 UJ	2 UJ	0.22 J	2 U	1.8 U	2.3 UL	1.9 UL	1.9 UL	1.9 UJ	2 UJ	2 UJ	1.9 UJ	2 UL
Methoxychlor	19 UJ	20 UJ	19 U	20 U	18 U	23 UL	19 UL	19 UL	19 UJ	20 UJ	20 UJ	19 UJ	20 UL
Toxaphene	94 UJ	100 UJ	94 U	97 U	90 U	110 UL	94 UL	93 UL	93 UJ	95 UJ	98 UJ	92 UJ	95 UL
Explosives (µg/kg)													
1,3,5-Trinitrobenzene	1,500 UL	1,500 UL	1,500 UL	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 UL	1,500 UL	1,500 UL	1,500 UL	1,500 U
1,3-Dinitrobenzene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 UL	1,500 U	1,500 U	1,500 U
2,4,6-Trinitrotoluene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
2-Amino-4,6-dinitrotoluene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 UL	1,500 U	1,500 U	1,500 U
2-Nitrotoluene	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
3-Nitrotoluene	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
4-Amino-2,6-dinitrotoluene	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 UL	1,500 U	1,500 U	1,500 U
4-Nitrotoluene	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U
HMX	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
RDX	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U	1,500 U
Tetryl	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 U	3,000 R	3,000 U	3,000 U	3,000 U
Total Metals (mg/kg)													
Aluminum	8,240	9,980	4,790	7,140	6,630	8,050	7,530	7,370	7,030	5,500	5,350	5,600	6,530
Antimony	0.49 J	0.4 J	0.38 J	0.66 J	0.37 J	0.44 J	0.39 J	1.1 U	1.1 U	1.2 UL	1.2 U	1.1 U	0.66 J
Arsenic	3.9	5.1	0.8 B	6.8	0.67 J	0.85 J	1.6	1.6	0.78 B	1.2 U	1.2 U	1.1 U	0.79 J
Barium	20.4 J	40.2	23.7	27.4	32.3	38.7	113	36.2	30	33.3	28.3	26.7	40
Beryllium	0.41 J	0.63	0.24 B	0.5 J	0.31 J	0.44 J	2.4	0.38 J	0.31 J	0.28 J	0.19 B	0.24 J	0.43 J
Cadmium	0.97	1.5	0.56 U	0.44 J	1.2	1.3	0.27 J	0.12 J	0.24 J	0.24 J	0.28 J	0.16 J	0.05 J
Calcium	5,320	4,650	252 J	140,000	278 J	323 J	7,520	1,260	303 J	249 J	364 J	292 J	435 J
Chromium	15.1	21	5.1	18.4	6.4	8.2	6.1	10.2	7.9	5	5.3	5.9	7.5
Cobalt	2.6	5.2	0.89	3	1.6	1.9	4.1	2.2	1.1	1.3	1	0.94	3.7
Copper	8.4	6.6	2.5	4.6	6.2	5.9	2.5	4	2.6	2.2	2.2	2.4	3.1
Cyanide	0.56 U	0.6 U	0.56 U	0.56 U	0.54 U	0.66 U	0.56 U	0.54 U	0.55 U	0.57 U	0.58 U	0.55 U	0.57 U
Iron	13,900	17,700	3,330	14,100	3,280	4,090	7,950	5,910	4,160	2,600	3,010	3,070	3,570
Lead	9.1	13.2	19.3	15.7	10.9	14.7	9.2	11.8	12.8	46.9	9.8	9.5	11
Magnesium	776	1,540	289 J	1,820	356 J	444 J	2,010	565	428 J	311 J	359 J	340 J	432 J
Manganese	51	106	69.4	87.1	109	120	963	76.8	67.1	79.4 K	49.8	66.4	170
Mercury	0.021 J	0.034 J	0.028 B	0.038 U	0.024 J	0.023 J	0.028 J	0.048	0.038	0.038 U	0.023 J	0.022 J	0.044
Nickel	4.7	8.9	2.1	6.5	3.4	4.1	10.5	4.2	2.5	2.5	2.2	2.1	4.6

CTO-205
Yorktown - Site 24
Validated Surface Soil Raw Analytical Results

Station ID	YS24-GW/SO05	YS24-GW/SO06	YS24-GW/SO07	YS24-GW/SO08	YS24-SS11		YS24-SS12	YS24-SS13	YS24-SS16	YS24-SS17	YS24-SS18	YS24-SS19	YS24-SS21
Sample ID	YS24-SS05-0410	YS24-SS06-0410	YS24-SS07-0410	YS24-SS08-0410	YS24-SS11-0410	YS24-SS11P-0410	YS24-SS12-0410	YS24-SS13-0410	YS24-SS16-0410	YS24-SS17-0410	YS24-SS18-0410	YS24-SS19-0410	YS24-SS21-0410
Sample Date	04/15/10	04/15/10	04/19/10	04/15/10	04/16/10	04/16/10	04/16/10	04/16/10	04/15/10	04/15/10	04/15/10	04/15/10	04/16/10
Chemical Name													
Potassium	999	1,740	256 J	1,520	340 J	435 J	624	549 J	523 J	278 J	430 J	309 J	404 J
Selenium	0.56 U	0.6 U	0.56 U	0.57 U	0.54 U	0.67 U	0.56 U	0.56 U	0.55 U	0.58 UL	0.58 U	0.55 U	0.58 U
Silver	0.56 U	0.6 U	0.56 U	0.57 U	0.54 U	0.67 U	0.56 U	0.56 U	0.55 U	0.58 U	0.58 U	0.55 U	0.58 U
Sodium	112 J	137 J	102 J	1,260	153 J	173 J	189 J	161 J	80.9 J	83.8 J	91.1 J	91.5 J	154 J
Thallium	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.1 U	1.2 U
Vanadium	22.1	24.2	7.7	18.9	11	14.2	13.1	15.1	12	8.5	9.6	9.8	11.4
Zinc	19.6	40.1	12.8	29.2	31.2	36.3	55.9	18	11.3	23.5	36.4	12.7	18.7
Wet Chemistry													
Cation Exchange Capacity (MEQ/100G) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	8.06	7.69	5.37	8.35	5.45	NA	6.02	5.95	6.78	5.41	6	5.85	5.45
Total organic carbon (TOC) (mg/kg)	2,262	76,070	14,910	5,832	8,592	NA	20,040	17,190	12,040	19,460	11,780	13,460	16,660
Geotechnical (g/cc)													
Density	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size (pct/p)													
Sieve No. 004 (4.75 mm)	94.8	NA	97.5	99.9	99.8	NA	97.9	98.4	96.4	100	95.8	99.7	99.8
Sieve No. 010 (2.00 mm)	84.8	NA	91.9	96	98.5	NA	88.1	86.1	87.8	97.8	95	97.5	92.2
Sieve No. 020 (850 um)	69.6	NA	81.5	78.9	90.4	NA	74.6	69.3	77	89.2	88.1	89.3	75.5
Sieve No. 040 (425 um)	53.9	NA	66.1	53	77.5	NA	61.4	52.1	65.7	77.3	78.2	76.6	59.3
Sieve No. 060 (250 um)	32.8	NA	41.5	31.3	48.8	NA	41.7	29.3	42.2	45.5	52	43.6	31.6
Sieve No. 080 (180 um)	14.5	NA	21.3	15.1	22.8	NA	19.5	12.3	19.5	22.1	26.8	19.6	11.3
Sieve No. 100 (150 um)	11.3	NA	17.1	12.4	17.9	NA	14.9	9.2	14.7	16.8	20.8	14.3	8.8
Sieve No. 230 (63-UM)	2.7	NA	5.2	4	3.3	NA	3.4	1.8	2.4	1.6	2.8	1.9	1.5
Sieve No. 200 (75 um)	3.7	NA	6	4.6	5.5	NA	5.4	2.4	3.7	2.7	4.8	2.6	2.1

Notes:

Shading indicates detections
B - Analyte not detected above the level reported in associated 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
NA - Not analyzed
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
g/cc - Grams per cubic centimeter
mg/kg - Milligrams per kilogram
pct/p - Percent Passed
ph - pH units
µg/kg - Micrograms per kilogram

Appendix L
Human Health Risk Assessment Tables

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	Surface Soil in Waste Area, Outside Waste Area, and Across Site	Trespasser/Visitor	Adult	Ingestion	On-site	Quant	Although access to area is restricted, assumed trespasser could access site and contact site surface soil across site and surface soil in the waste area.
						Dermal Absorption	On-site	Quant	Although access to area is restricted, assumed trespasser could access site and contact site surface soil across site and surface soil in the waste area.
					Adolescent	Ingestion	On-site	Quant	Although access to area is restricted, assumed trespasser could access site and contact site surface soil across site and surface soil in the waste area.
						Dermal Absorption	On-site	Quant	Although access to area is restricted, assumed trespasser could access site and contact site surface soil across site and surface soil in the waste area.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial worker could contact surface soil and surface soil in and outside the waste area while working at the site. Currently site used for war games and training. Industrial worker conservatively assumed to represent current worker (military personnel involved in war games and training) exposure to surface soil at site.
						Dermal Absorption	On-site	Quant	Industrial worker could contact surface soil and surface soil in and outside the waste area while working at the site. Currently site used for war games and training. Industrial worker conservatively assumed to represent current worker (military personnel involved in war games and training) exposure to surface soil at site.
		Air	Emissions from Surface Soil in Waste Area, Outside Waste Area, Across Site	Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Although access to site is restricted, assumed trespasser/visitor could access site and inhale vapors and dust from site surface soil and surface soil in and outside the waste area disturbed during activities at the site.
					Adolescent	Inhalation	On-site	Quant	Although access to site is restricted, assumed trespasser/visitor could access site and inhale vapors and dust from site surface soil and surface soil in and outside the waste area disturbed during activities at the site.
				Industrial Worker	Adult	Inhalation	On-site	Quant	While working at the site, industrial worker could inhale vapors and dust from site surface soil and surface soil in and outside the waste area disturbed at the site. Currently site used for war games and training. Industrial worker conservatively assumed to represent current worker (military personnel involved in war games and training) exposure to surface soil at site.
	Soil*	Soil*	Soil* in Sludge Area	Trespasser/Visitor	Adult	Ingestion	On-site	Quant	Although access to area is restricted, assumed trespasser may access site and contact soil in area where black sludge is found.
						Dermal Absorption	On-site	Quant	Although access to area is restricted, assumed trespasser may access site and contact soil in area where black sludge is found.
					Adolescent	Ingestion	On-site	Quant	Although access to area is restricted, assumed trespasser may access site and contact soil in area where black sludge is found.
						Dermal Absorption	On-site	Quant	Although access to area is restricted, assumed trespasser may access site and contact soil in area where black sludge is found.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial worker could contact soil in sludge area while working at the site. Planned future use of the site is for training operations and war games. Traditional industrial worker scenario used to conservatively estimate exposure to soil for personel using site for training and for potential fututre industrial worker at site.
						Dermal Absorption	On-site	Quant	Industrial worker could contact soil in sludge area while working at the site. Planned future use of the site is for training operations and war games. Traditional industrial worker scenario used to conservatively estimate exposure to soil for personel using site for training and for potential fututre industrial worker at site.

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future (cont.)	Soil* (cont.)	Air	Emissions from Soil* in Sludge Area	Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Although access to site is restricted, assumed trespasser/visitor could inhale vapors and dust from soil from area where black sludge is found disturbed during activities at the site.
					Adolescent	Inhalation	On-site	Quant	Although access to site is restricted, assumed trespasser/visitor could inhale vapors and dust from soil from area where black sludge is found disturbed during activities at the site.
				Industrial Worker	Adult	Inhalation	On-site	Quant	While working in the area where black sludge is found, industrial worker could inhale vapors and dust from site.
		Soil*	Soil* in Waste Area, Outside Waste Area, and Across site	Resident	Adult	Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact site soil and soil in and outside the waste area.
						Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact site soil and soil inand outside the waste area.
					Child	Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact site soil and soil in and outside the waste area.
						Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact site soil and soil in and outside the waste area.
					Child/Adult	Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact site soil and soil in and outside the waste area.
						Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact site soil and soil in and outside the waste area.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Industrial worker could contact site soil and soil in and outside the waste area while working at the site. Planned future use of the site is for training operations and war games. Traditional industrial worker scenario used to conservatively estimate exposure to soil for personel using site for training and for potential fututre industrial worker at site.
						Dermal Absorption	On-site	Quant	Industrial worker could contact site soil and soil in and outside the waste area while working at the site. Planned future use of the site is for training operations and war games. Traditional industrial worker scenario used to conservatively estimate exposure to soil for personel using site for training and for potential fututre industrial worker at site.
				Construction Worker	Adult	Ingestion	On-site	Quant	Future construction workers could contact site soil and soil in and outside the waste area while performing activities at the site.
						Dermal Absorption	On-site	Quant	Future construction workers could contact site soil and soil in and outside the waste area while performing activities at the site.
				Trespasser/Visitor	Adult	Ingestion	On-site	Quant	Although access to area is currently restricted, assumed trespasser may access site soil and soil in and outside the waste area.
						Dermal Absorption	On-site	Quant	Although access to area is currently restricted, assumed trespasser may access site soil and soil in and outside the waste area.
					Adolescent	Ingestion	On-site	Quant	Although access to area is currently restricted, assumed trespasser may access site soil and soil in and outside the waste area.
						Dermal Absorption	On-site	Quant	Although access to area is currently restricted, assumed trespasser may access site soil and soil in and outside the waste area.
		Air	Emissions from Soil* in Waste Area, Across Site, and Outside Waste Area	Resident	Adult	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from site soil and soil in and outside the waste area.
					Child	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from site soil and soil in and outside the waste area.
					Child/Adult	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from site soil and soil in and outside the waste area.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Future Industrial Worker may inhale vapors and dust from areas of site soil and soil in and outside the waste area disturbed during activities at the site. Planned future use of the site is for training operations and war games. Traditional industrial worker scenario used to conservatively estimate exposure to soil for personel using site for training and for potential fututre industrial worker at site.

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future (cont.)	Soil* (cont.)	Air (cont.)	Emissions from Soil* in Waste Area, Across Site, and Outside Waste Area (cont.)	Construction Worker	Adult	Inhalation	On-site	Quant	Construction worker could inhale vapors and dust from site soil and soil in and outside the waste area while working at the site.
				Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Although access to site is currently restricted, assumed trespasser/visitor could inhale vapors and dust from site soil and soil in and outside the waste area disturbed during activities at the site.
					Adolescent	Inhalation	On-site	Quant	Although access to site is currently restricted, assumed trespasser/visitor could inhale vapors and dust from site soil and soil in and outside the waste area disturbed during activities at the site.
Future	Soil*	Soil*	Soil* in Sludge Area	Resident	Adult	Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil in area where black sludge is found.
						Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil in area where black sludge is found.
					Child	Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil in area where black sludge is found.
						Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil in area where black sludge is found.
					Child/Adult	Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil in area where black sludge is found.
						Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil in area where black sludge is found.
				Construction Worker	Adult	Ingestion	On-site	Quant	Future construction workers could contact soil in area where black sludge is found while performing activities at the site.
						Dermal Absorption	On-site	Quant	Future construction workers could contact soil in area where black sludge is found while performing activities at the site.
		Air	Emissions from Soil* in Sludge Area	Resident	Adult	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from soil in area where black sludge is found.
					Child	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from soil in are where black sludge is found.
					Child/Adult	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from soil in area where black sludge is found.
				Construction Worker	Adult	Inhalation	On-site	Quant	Construction worker could inhale vapors and dust from soil in area where black sludge is found while working at the site.
	Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer - Tap Water and Yorktown-Eastover Deep Aquifer - Tap Water	Resident	Adult	Ingestion	On-site	Quant	Although unlikely, groundwater will be evaluated for use as a future potable water supply.
						Dermal Absorption	On-site	Quant	Although unlikely, groundwater will be evaluated for use as a future potable water supply.
					Child	Ingestion	On-site	Quant	Although unlikely, groundwater will be evaluated for use as a future potable water supply.
						Dermal Absorption	On-site	Quant	Although unlikely, groundwater will be evaluated for use as a future potable water supply.
					Child/Adult	Ingestion	On-site	Quant	Although unlikely, groundwater will be evaluated for use as a future potable water supply. Child/Adult evaluated for cancer risk only.
						Dermal Absorption	On-site	Quant	Although unlikely, groundwater will be evaluated for use as a future potable water supply. Child/Adult evaluated for cancer risk only.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Although unlikely, groundwater will be evaluated for use as a future potable water supply.
						Dermal Absorption	On-site	None	Industrial workers not expected to take a significant number of showers/baths at workplace.
			Cornwalis Cave Shallow Aquifer - Water in Excavation Pit	Construction Worker	Adult	Ingestion	On-site	None	Incidental ingestion of groundwater from an excavation during excavation and construction activities expected to be insignificant compared to dermal exposure.
						Dermal Absorption	On-site	Quant	Construction worker may contact groundwater in an excavation during excavation and construction activities.

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future (continued)	Groundwater	Air	Cornwalis Cave Shallow Aquifer and Yorktown-Eastover Deep Aquifer - Water Vapors at Showerhead	Resident	Adult	Inhalation	On-site	Quant	Although unlikely, groundwater will be evaluated for use as future potable water supply.
					Child	Inhalation	On-site	Quant	Although unlikely, groundwater will be evaluated for use as future potable water supply.
					Child/Adult	Inhalation	Onsite	Quant	Although unlikely, groundwater will be evaluated for use as future potable water supply.
				Industrial Worker	Adult	Inhalation	On-site	None	Industrial workers not expected to take a significant number of showers/baths at workplace.
			Cornwalis Cave Shallow Aquifer - Volatilization from Water in Excavation Pit	Construction Worker	Adult	Inhalation	On-site	Quant	Construction worker may inhale volatiles from groundwater in an excavation during excavation and construction activities.
		Air	Cornwalis Cave Shallow Aquifer - Vapor Intrusion to Indoor Air	Resident	Adult	Inhalation	On-site	Quant	Future resident could inhale vapors migrating from groundwater in indoor air if future resident constructed on site.
					Child	Inhalation	On-site	Quant	Future resident could inhale vapors migrating from groundwater into indoor air if future resident constructed on site.
					Child/Adult	Inhalation	Onsite	Quant	Although unlikely, groundwater will be evaluated for use as future potable water supply.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Future industrial workers could inhale vapors migrating from groundwater into indoor air if future industrial building constructed on site.

Quant: will be quantitatively evaluated.

None: Not considered to be a complete pathway, therefore, not evaluated.

Soil* - combined surface and subsurface soil

Table 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

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 In Waste Area	78-93-3	2-Butanone	4.0E-03 J	1.5E-02	MG/KG	YS24-SS14-0410	3/8	0.004 - 0.012	1.5E-02	N/A	2.8E+03 N	1.5E+00	SSL	NO	BSL
	56-23-5	Carbon tetrachloride	2.0E-03 J	2.0E-03 J	MG/KG	A06TP01-01	1/9	0.002 - 0.012	2.0E-03	N/A	6.1E-01 C	1.7E-04	SSL	NO	BSL
	74-87-3	Chloromethane	5.7E-04 J	5.7E-04 J	MG/KG	YS24-SS20-0410	1/9	0.0033 - 0.012	5.7E-04	N/A	1.2E-01 N	4.9E-02	SSL	NO	BSL
	79-20-9	Methyl acetate	2.8E-03 J	8.2E-03	MG/KG	YS24-SS14-0410	2/3	0.0033 - 0.0046	8.2E-03	N/A	7.8E+03 N	7.5E+00	SSL	NO	BSL
	75-09-2	Methylene chloride	1.3E-02	1.3E-02	MG/KG	A06TP03-01	1/9	0.003 - 0.013	1.3E-02	N/A	1.1E+01 C	1.2E-03	SSL	NO	BSL
	1330-20-7	Xylene, total	1.0E-03 J	1.0E-03 J	MG/KG	A06TP01-01	1/9	0.001 - 0.012	1.0E-03	N/A	6.3E+01 N	2.0E-01	SSL	NO	BSL
	50-32-8	**Benzo(a)pyrene**	**4.0E-02 J**	**4.0E-02 J**	**MG/KG**	**A06SS06-00**	**1/9**	**0.04 - 0.54**	**4.0E-02**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**3.8E-02 J**	**3.8E-02 J**	**MG/KG**	**YS24-SS20-0410**	**1/9**	**0.19 - 0.54**	**3.8E-02**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**CPAH**
	191-24-2	Benzo(g,h,i)perylene	1.0E-01 J	1.7E-01 J	MG/KG	A06SS06-00	2/9	0.1 - 0.54	1.7E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**2.9E-02 J**	**2.9E-02 J**	**MG/KG**	**YS24-SS20-0410**	**1/9**	**0.19 - 0.54**	**2.9E-02**	**N/A**	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**CPAH**
	117-81-7	bis(2-Ethylhexyl)phthalate	2.2E-01 J	8.4E-01	MG/KG	YS24-SS20-0410	2/9	0.19 - 0.54	8.4E-01	N/A	3.5E+01 C*	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	6.9E-02 J	6.9E-02 J	MG/KG	YS24-SS20-0410	1/9	0.19 - 0.54	6.9E-02	N/A	2.6E+02 C*	5.1E-01	SSL	NO	BSL
	84-74-2	Di-n-butylphthalate	4.2E-02 J	6.8E-01	MG/KG	A06SS06-00	5/9	0.042 - 0.68	6.8E-01	N/A	6.1E+02 N	9.2E+00	SSL	NO	BSL
	129-00-0	Pyrene	2.5E-02 J	5.7E-02 J	MG/KG	A06SS06-00	2/9	0.057 - 0.54	5.7E-02	N/A	1.7E+02 N	1.2E+02	SSL	NO	BSL
	72-55-9	4,4'-DDE	2.3E-03 J	2.3E-03 J	MG/KG	YS24-SS20-0410	1/9	0.0037 - 0.0054	2.3E-03	N/A	1.4E+00 C	4.7E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	5.6E-03 J	5.6E-03 J	MG/KG	YS24-SS20-0410	1/9	0.0037 - 0.0054	5.6E-03	N/A	1.7E+00 C*	6.7E-02	SSL	NO	BSL
	319-84-6	alpha-BHC	2.9E-04 J	2.9E-04 J	MG/KG	YS24-SS20-0410	1/9	0.0019 - 0.0028	2.9E-04	N/A	7.7E-02 C	6.2E-05	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	2.3E-04 J	9.8E-03 J	MG/KG	A06TP03-01	3/9	0.0019 - 0.0098	9.8E-03	N/A	1.6E+00 C*	N/A		NO	BSL
	11097-69-1	**Aroclor-1254**	**5.9E-01**	**5.9E-01**	**MG/KG**	**A06TP03-01**	**1/9**	**0.019 - 0.59**	**5.9E-01**	**N/A**	**1.1E-01 C****	**8.8E-03**	**SSL**	**YES**	**ASL**
	11096-82-5	Aroclor-1260	1.9E-01 J	1.9E-01 J	MG/KG	A06TP03-01	1/9	0.019 - 0.19	1.9E-01	N/A	2.2E-01 C	2.4E-02	SSL	NO	BSL
	319-85-7	beta-BHC	1.4E-03 J	2.9E-03 J	MG/KG	YS24-SS15-0410	2/9	0.00096 - 0.0028	2.9E-03	N/A	2.7E-01 C	2.2E-04	SSL	NO	BSL
	319-86-8	delta-BHC	8.4E-04 J	8.4E-04 J	MG/KG	A06TP03-01	1/9	0.00084 - 0.0028	8.4E-04	N/A	2.7E-01 C	N/A		NO	BSL
	72-20-8	Endrin	4.1E-04 J	2.9E-02	MG/KG	A06TP03-01	2/9	0.0037 - 0.029	2.9E-02	N/A	1.8E+00 N	4.4E-01	SSL	NO	BSL
	58-89-9	gamma-BHC (Lindane)	5.2E-04 J	5.2E-04 J	MG/KG	YS24-SS20-0410	1/9	0.0019 - 0.0028	5.2E-04	N/A	5.2E-01 C*	3.6E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	3.7E-04 J	2.1E-03 J	MG/KG	YS24-SS20-0410	2/9	0.0019 - 0.0028	2.1E-03	N/A	1.6E+00 C*	N/A		NO	BSL
	76-44-8	Heptachlor	2.0E-04 J	2.0E-04 J	MG/KG	YS24-SS14-0410	1/9	0.0019 - 0.0028	2.0E-04	N/A	1.1E-01 C	1.2E-03	SSL	NO	BSL
	7429-90-5	**Aluminum**	**4.3E+03**	**1.2E+04**	**MG/KG**	**A06TP03-01**	**9/9**	**21.9 - 11600**	**1.2E+04**	**1.2E+04**	**7.7E+03 N**	**5.5E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	3.6E-01 J	4.4E-01 J	MG/KG	YS24-SS14-0410 : YS24-SS15-041	3/6	1.1 - 2.9	4.4E-01	1.1E+01	3.1E+00 N	6.6E-01	SSL	NO	BSL
	7440-38-2	**Arsenic**	**1.0E+00 K**	**5.6E+00**	**MG/KG**	**A06TP03-01**	**8/9**	**1 - 5.6**	**5.6E+00**	**6.4E+00**	**3.9E-01 C***	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.9E+01	7.4E+01	MG/KG	A06TP03-01	9/9	19.3 - 73.8	7.4E+01	5.3E+01	1.5E+03 N	3.0E+02	SSL	NO	BSL
	7440-41-7	Beryllium	2.2E-01	4.0E-01 J	MG/KG	YS24-SS14-0410	8/9	0.22 - 0.56	4.0E-01	5.9E-01	1.6E+01 N	5.8E+01	SSL	NO	BSL
	7440-43-9	**Cadmium**	**1.3E-01 J**	**7.9E+02**	**MG/KG**	**A06TP03-01**	**5/9**	**0.32 - 786**	**7.9E+02**	**1.5E+00**	**7.0E+00 N**	**N/A**		**YES**	**ASL**
	7440-70-2	Calcium	2.2E+02 J	1.4E+03	MG/KG	YS24-SS14-0410	9/9	466 - 1300	1.4E+03	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**4.5E+00**	**2.1E+01**	**MG/KG**	**A06TP03-01**	**9/9**	**1.1 - 20.6**	**2.1E+01**	**1.8E+01**	**2.9E-01 C**	**8.3E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**7.1E-01**	**6.0E+00**	**MG/KG**	**A06TP03-01**	**9/9**	**0.55 - 6**	**6.0E+00**	**9.9E+00**	**2.3E+00 N**	**4.9E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.3E+00	7.4E+01	MG/KG	A06TP03-01	9/9	0.55 - 74.4	7.4E+01	4.3E+00	3.1E+02 N	5.1E+01	SSL	NO	BSL

Table 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

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
	7439-89-6	**Iron**	**3.0E+03 J**	**1.1E+04**	**MG/KG**	**A06TP03-01**	**9/9**	**10.9 - 11000**	**1.1E+04**	**2.0E+04**	**5.5E+03 N**	**6.4E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	5.0E+00	3.4E+02	MG/KG	A06TP03-01	9/9	0.33 - 344	3.4E+02	1.7E+01	4.0E+02 N	N/A		NO	BSL
	7439-95-4	Magnesium	2.3E+02	6.9E+02	MG/KG	YS24-SS14-0410	9/9	232 - 639	6.9E+02	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	Manganese	2.0E+01 J	1.7E+02	MG/KG	A06SS08-00	9/9	1.1 - 171	1.7E+02	3.2E+02	1.8E+02 N	N/A		NO	BSL
	7439-97-6	Mercury	2.3E-02 J	1.3E+00	MG/KG	A06TP03-01	4/9	0.037 - 1.3	1.3E+00	1.1E-01	2.3E+00 N	3.3E-02	SSL	NO	BSL
	7440-02-0	Nickel	1.5E+00	1.8E+01	MG/KG	A06TP03-01	9/9	0.55 - 17.8	1.8E+01	9.5E+00	1.5E+02 N	4.8E+01	SSL	NO	BSL
	7440-09-7	Potassium	2.4E+02	7.7E+02	MG/KG	YS24-SS15-0410	8/9	235 - 561	7.7E+02	7.1E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	6.2E-01 K	6.2E-01 K	MG/KG	A06SS08D-00	1/9	0.55 - 0.84	6.2E-01	5.1E-01	3.9E+01 N	9.5E-01	SSL	NO	BSL
	7440-22-4	Silver	3.3E+00	8.8E+00	MG/KG	A06TP03-01	2/9	0.43 - 8.8	8.8E+00	2.1E+00	3.9E+01 N	1.6E+00	SSL	NO	BSL
	7440-23-5	Sodium	2.4E+01	1.8E+02 J	MG/KG	YS24-SS14-0410	9/9	23.7 - 561	1.8E+02	5.2E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	6.5E+00	1.9E+01	MG/KG	A06TP03-01	9/9	2.2 - 18.9	1.9E+01	2.8E+01	3.9E+01 N	N/A		NO	BSL
	7440-66-6	Zinc	7.9E+00 J	1.2E+03	MG/KG	A06TP03-01	9/9	2.2 - 1190	1.2E+03	2.7E+01	2.3E+03 N	6.8E+02	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are 95% UTL from Cheatham Annex/Yorktown background surface soil samples.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) 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 Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)

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
K = Biased High
C = Carcinogenic
C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
SSL = Soil Screening Level for Protection of Groundwater, from RSL Table
S = Concentration exceeds Csat, used Csat as screening value
MG/KG = milligrams per kilogram
N/A = Not applicable

Table 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

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
Emissions from Surface Soil In Waste Area	78-93-3	2-Butanone	2.3E-04 J	8.6E-04	µg/m^3	YS24-SS14-0410	3/8	N/A	8.6E-04	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	56-23-5	Carbon tetrachloride	9.4E-04 J	9.4E-04 J	µg/m^3	A06TP01-01	1/9	N/A	9.4E-04	N/A	4.1E-01 C	N/A	N/A	NO	BSL
	74-87-3	Chloromethane	3.4E-04 J	3.4E-04 J	µg/m^3	YS24-SS20-0410	1/9	N/A	3.4E-04	N/A	9.4E+00 N	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	2.4E-04 J	7.1E-04	µg/m^3	YS24-SS14-0410	2/3	N/A	7.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	75-09-2	Methylene chloride	4.2E-03	4.2E-03	µg/m^3	A06TP03-01	1/9	N/A	4.2E-03	N/A	5.2E+00 C	N/A	N/A	NO	BSL
	1330-20-7	Xylene, total	1.2E-04 J	1.2E-04 J	µg/m^3	A06TP01-01	1/9	N/A	1.2E-04	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	2.9E-08 J	2.9E-08 J	µg/m^3	A06SS06-00	1/9	N/A	2.9E-08	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	2.8E-08 J	2.8E-08 J	µg/m^3	YS24-SS20-0410	1/9	N/A	2.8E-08	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	7.4E-08 J	1.3E-07 J	µg/m^3	A06SS06-00	2/9	N/A	1.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	2.1E-08 J	2.1E-08 J	µg/m^3	YS24-SS20-0410	1/9	N/A	2.1E-08	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.6E-07 J	6.2E-07	µg/m^3	YS24-SS20-0410	2/9	N/A	6.2E-07	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	5.1E-08 J	5.1E-08 J	µg/m^3	YS24-SS20-0410	1/9	N/A	5.1E-08	N/A	N/A	N/A	N/A	NO	NTX
	84-74-2	Di-n-butylphthalate	3.1E-08 J	5.0E-07	µg/m^3	A06SS06-00	5/9	N/A	5.0E-07	N/A	N/A	N/A	N/A	NO	NTX
	129-00-0	Pyrene	7.4E-06 J	1.7E-05 J	µg/m^3	A06SS06-00	2/9	N/A	1.7E-05	N/A	N/A	N/A	N/A	NO	NTX
	72-55-9	4,4'-DDE	1.7E-09 J	1.7E-09 J	µg/m^3	YS24-SS20-0410	1/9	N/A	1.7E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	4.1E-09 J	4.1E-09 J	µg/m^3	YS24-SS20-0410	1/9	N/A	4.1E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	319-84-6	alpha-BHC	2.1E-10 J	2.1E-10 J	µg/m^3	YS24-SS20-0410	1/9	N/A	2.1E-10	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	1.7E-10 J	7.2E-09 J	µg/m^3	A06TP03-01	3/9	N/A	7.2E-09	N/A	N/A	N/A	N/A	NO	NTX
	11097-69-1	Aroclor-1254	4.3E-07	4.3E-07	µg/m^3	A06TP03-01	1/9	N/A	4.3E-07	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	11096-82-5	Aroclor-1260	1.4E-07 J	1.4E-07 J	µg/m^3	A06TP03-01	1/9	N/A	1.4E-07	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	319-85-7	beta-BHC	1.0E-09 J	2.1E-09 J	µg/m^3	YS24-SS15-0410	2/9	N/A	2.1E-09	N/A	4.6E-03 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	6.2E-10 J	6.2E-10 J	µg/m^3	A06TP03-01	1/9	N/A	6.2E-10	N/A	N/A	N/A	N/A	NO	NTX
	72-20-8	Endrin	3.0E-10 J	2.1E-08	µg/m^3	A06TP03-01	2/9	N/A	2.1E-08	N/A	N/A	N/A	N/A	NO	NTX
	58-89-9	gamma-BHC (Lindane)	3.8E-10 J	3.8E-10 J	µg/m^3	YS24-SS20-0410	1/9	N/A	3.8E-10	N/A	7.8E-03 C	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	2.7E-10 J	1.5E-09 J	µg/m^3	YS24-SS20-0410	2/9	N/A	1.5E-09	N/A	2.4E-02 C*	N/A	N/A	NO	BSL
	76-44-8	Heptachlor	1.5E-10 J	1.5E-10 J	µg/m^3	YS24-SS14-0410	1/9	N/A	1.5E-10	N/A	1.9E-03 C	N/A	N/A	NO	BSL
	7429-90-5	Aluminum	3.2E-03	8.5E-03	µg/m^3	A06TP03-01	9/9	N/A	8.5E-03	N/A	5.2E-01 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	2.6E-07 J	3.2E-07 J	µg/m^3	YS24-SS14-0410 : YS24-SS15-0410	3/6	N/A	3.2E-07	N/A	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	7.4E-07 K	4.1E-06	µg/m^3	A06TP03-01	8/9	N/A	4.1E-06	N/A	5.7E-04 C*	N/A	N/A	NO	BSL
	7440-39-3	Barium	1.4E-05	5.4E-05	µg/m^3	A06TP03-01	9/9	N/A	5.4E-05	N/A	5.2E-02 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	1.6E-07	2.9E-07 J	µg/m^3	YS24-SS14-0410	8/9	N/A	2.9E-07	N/A	1.0E-03 C*	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	9.6E-08 J	5.8E-04	µg/m^3	A06TP03-01	5/9	N/A	5.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	7440-70-2	Calcium	1.6E-04 J	1.0E-03	µg/m^3	YS24-SS14-0410	9/9	N/A	1.0E-03	N/A	N/A	N/A	N/A	NO	NUT
	7440-47-3	**Chromium**	**3.3E-06**	**1.5E-05**	**µg/m^3**	**A06TP03-01**	**9/9**	**N/A**	**1.5E-05**	**N/A**	**1.1E-05 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	5.2E-07	4.4E-06	µg/m^3	A06TP03-01	9/9	N/A	4.4E-06	N/A	2.7E-04 C*	N/A	N/A	NO	BSL
	7440-50-8	Copper	9.6E-07	5.5E-05	µg/m^3	A06TP03-01	9/9	N/A	5.5E-05	N/A	N/A	N/A	N/A	NO	NTX

Table 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

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
	7439-89-6	Iron	2.2E-03 J	8.1E-03	$\mu g/m^3$	A06TP03-01	9/9	N/A	8.1E-03	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	3.7E-06	2.5E-04	$\mu g/m^3$	A06TP03-01	9/9	N/A	2.5E-04	N/A	N/A	N/A	N/A	NO	NTX
	7439-95-4	Magnesium	1.7E-04	5.1E-04	$\mu g/m^3$	YS24-SS14-0410	9/9	N/A	5.1E-04	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	1.5E-05 J	1.3E-04	$\mu g/m^3$	A06SS08-00	9/9	N/A	1.3E-04	N/A	N/A	N/A	N/A	NO	NTX
	7439-97-6	Mercury	1.7E-08 J	9.6E-07	$\mu g/m^3$	A06TP03-01	4/9	N/A	9.6E-07	N/A	3.1E-02 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	1.1E-06	1.3E-05	$\mu g/m^3$	A06TP03-01	9/9	N/A	1.3E-05	N/A	9.4E-03 C*	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.7E-04	5.6E-04	$\mu g/m^3$	YS24-SS15-0410	8/9	N/A	5.6E-04	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	4.6E-07 K	4.6E-07 K	$\mu g/m^3$	A06SS08D-00	1/9	N/A	4.6E-07	N/A	2.1E+00 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	2.4E-06	6.5E-06	$\mu g/m^3$	A06TP03-01	2/9	N/A	6.5E-06	N/A	N/A	N/A	N/A	NO	NTX
	7440-23-5	Sodium	1.7E-05	1.4E-04 J	$\mu g/m^3$	YS24-SS14-0410	9/9	N/A	1.4E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-62-2	Vanadium	4.8E-06	1.4E-05	$\mu g/m^3$	A06TP03-01	9/9	N/A	1.4E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-66-6	Zinc	5.8E-06 J	8.8E-04	$\mu g/m^3$	A06TP03-01	9/9	N/A	8.8E-04	N/A	N/A	N/A	N/A	NO	NTX

[1] Minimum/Maximum calculated air concentrations from soil concentrations. Air concentrations calculated as Cair = Csoil*1000*(1/PEF+1/VF)
VF calculated for volatile and semi-volatile analytes identified as volatile in the Regional Screening Levels for Chemical Contaminants at Superfund Sites (Oak Ridge National Laboratory, June 2011). VF calculated on Table 2 Supplement. PEF = 1.36×10^9 m^3/kg.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Air. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10).
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
C = Carcinogenic
C* = C screening value used as screening level
N = Noncarcinogenic
$\mu g/m^3$ = micrograms per cubic meter
N/A = Not applicable

Table 2.2 Supplement A
Calculation of Volatilization Factors
Site 24
NWS Yorktown, Yorktown, Virginia

Chemical	Diffusivity in Air (D_i) (cm^2/s)	Henry's Law Constant (H') (unitless)	Diffusivity in Water (D_w) (cm^2/s)	Soil Organic Carbon Partition Coeff. (K_{oc}) (cm^3/g)	Soil Water Partition Coeff. ($K_d = K_{oc} \times F_{oc}$) ($g/cm^3$)	Solubility in Water (S) (mg/L)	Apparent Diffusivity (D_A) (cm^2/s)	Volatilization Factor (VF) (m^3/kg)	Soil Saturation Concentration (C_{sat}) (mg/kg)
Volatile Organics									
1,2,4-Trichlorobenzene	3.96E-02	5.81E-02	8.40E-06	1.36E+03	8.14E+00	4.90E+01	1.49E-05	4.26E+04	4.04E+02
1,4-Dichlorobenzene	5.50E-02	9.85E-02	8.68E-06	3.75E+02	2.25E+00	8.13E+01	1.22E-04	1.49E+04	1.93E+02
2-Butanone	9.14E-02	2.33E-03	1.02E-05	4.51E+00	2.71E-02	2.23E+05	8.94E-05	1.74E+04	2.84E+04
Acetone	1.06E-01	1.43E-03	1.15E-05	2.36E+00	1.42E-02	1.00E+06	7.12E-05	1.95E+04	1.14E+05
Benzene	8.95E-02	2.27E-01	1.03E-05	1.46E+02	8.75E-01	1.79E+03	1.06E-03	5.04E+03	1.82E+03
Carbon disulfide	1.06E-01	5.89E-01	1.30E-05	2.17E+01	1.30E-01	2.16E+03	9.77E-03	1.66E+03	7.38E+02
Carbon Tetrachloride	5.71E-02	1.13E+00	9.78E-06	4.39E+01	2.63E-01	7.93E+02	5.95E-03	2.13E+03	4.58E+02
Chlorobenzene	7.21E-02	1.27E-01	9.48E-06	2.34E+02	1.40E+00	4.98E+02	3.20E-04	9.19E+03	7.61E+02
Chloromethane	1.24E-01	3.61E-01	1.36E-05	1.32E+01	7.93E-02	5.32E+03	9.62E-03	1.68E+03	1.32E+03
Ethylbenzene	6.85E-02	3.22E-01	8.46E-06	4.46E+02	2.68E+00	1.69E+02	4.14E-04	8.07E+03	4.80E+02
Isopropylbenzene	6.03E-02	4.70E-01	7.86E-06	6.98E+02	4.19E+00	6.13E+01	3.45E-04	8.84E+03	2.68E+02
Methyl Acetate	9.58E-02	4.70E-03	1.10E-05	3.06E+00	1.84E-02	2.43E+05	2.02E-04	1.16E+04	2.90E+04
2-Methylnaphthalene	5.24E-02	2.12E-02	7.78E-06	2.48E+03	1.49E+01	2.46E+01	3.95E-06	8.26E+04	3.68E+02
Methylene Chloride	9.99E-02	1.33E-01	1.25E-05	2.17E+01	1.30E-01	1.30E+04	2.77E-03	3.12E+03	3.32E+03
o-Xylene	6.89E-02	2.12E-01	8.53E-06	3.83E+02	2.30E+00	1.78E+02	3.19E-04	9.20E+03	4.34E+02
Styrene	7.11E-02	1.12E-01	8.78E-06	4.46E+02	2.68E+00	3.10E+02	1.52E-04	1.33E+04	8.67E+02
Tetrachloroethene	5.05E-02	7.24E-01	9.46E-06	9.49E+01	5.70E-01	2.06E+02	2.41E-03	3.35E+03	1.66E+02
Toluene	7.78E-02	2.71E-01	9.20E-06	2.34E+02	1.40E+00	5.26E+02	7.24E-04	6.11E+03	8.18E+02
Xylene	8.47E-02	2.12E-01	9.90E-06	3.83E+02	2.30E+00	1.06E+02	3.92E-04	8.29E+03	2.58E+02
Semivolatile Organics									
2-Chloronaphthalene	4.47E-02	1.31E-02	7.73E-06	2.48E+03	1.49E+01	1.17E+01	2.08E-06	1.14E+05	1.75E+02
Anthracene	3.90E-02	2.27E-03	7.85E-06	1.64E+04	9.82E+01	4.34E-02	4.85E-08	7.46E+05	4.26E+00
Benzaldehyde	7.44E-02	1.09E-03	9.46E-06	1.11E+01	6.65E-02	6.95E+03	2.63E-05	3.20E+04	1.16E+03
Dibenzofuran	4.10E-02	8.71E-03	7.38E-06	9.16E+03	5.50E+01	3.10E+00	3.47E-07	2.79E+05	1.71E+02
Naphthalene	6.05E-02	1.80E-02	8.38E-06	1.54E+03	9.26E+00	3.10E+01	6.20E-06	6.60E+04	2.90E+02
Pyrene	2.78E-02	4.87E-04	7.25E-06	5.43E+04	3.26E+02	1.35E-01	2.35E-09	3.39E+06	4.40E+01

Volatilization factor (VF) = (m^3/kg)

$$\frac{Q/C * (3.14 * D_A * T)^{1/2} * 10^{-4}\ m^2/cm^2}{2 * \rho_b * D_A}$$

Apparent Diffusivity (D_A) = (cm^2/s)

$$\frac{[(\Theta_a^{10/3} * D_i * H' + \Theta_w^{10/3} * D_w)/n^2]}{(\rho_b * K_d + \Theta_w + \Theta_a * H')}$$

Soil Saturation Concentration (C_{sat}) =

$$S/\rho_b * (K_d * \rho_b + \Theta_w + H' * \Theta_a)$$

Parameters	Values
Q/C - Inverse of the mean concentration at the center of a 0.5-acre-square source (g/m^2-s per kg/m^3)	90.24
T - Exposure interval(s)	9.5E+08
r_b - Soil bulk density (g/cm^3)	1.5
Q_a - Air-filled soil porosity (L_{air}/L_{water}) = n - Q_w	0.28
n - Total soil porosity (Lpore/Lsoil) = 1 - (r_b/r_s)	0.43
Q_w - Water-filled soil porosity (Lwater/Lsoil)	0.15
r_s - Soil particle density (g/cm^3)	2.65
f_{oc} - fraction organic carbon in soil (g/g)	0.006

Equations and chemical properties from USEPA, 1996. *Soil Screening Guidance: User's Guide.* EPA/540/R-96/018.
Physical/chemical properties from USEPA Regional Screening Table, June 2011.

Table 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

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 Across Site	106-46-7	1,4-Dichlorobenzene	5.2E-02 J	5.2E-02 J	MG/KG	A06SS13-00	1/50	0.0015 - 0.54	5.2E-02	N/A	2.4E+00 C	4.1E-04	SSL	NO	BSL
	78-93-3	2-Butanone	4.0E-03 J	3.9E-02 J	MG/KG	YS24-SS02-0410	16/44	0.0037 - 0.016	3.9E-02	N/A	2.8E+03 N	1.5E+00	SSL	NO	BSL
	67-64-1	Acetone	3.0E-03 J	3.0E-03 J	MG/KG	A06SS12-00	1/50	0.003 - 0.019	3.0E-03	N/A	6.1E+03 N	4.5E+00	SSL	NO	BSL
	71-43-2	Benzene	2.0E-04 K	2.4E-04 J	MG/KG	YS24-SS08-0410	2/50	0.0015 - 0.012	2.4E-04	N/A	1.1E+00 C*	2.1E-04	SSL	NO	BSL
	75-15-0	Carbon disulfide	7.1E-04 J	3.8E-03 K	MG/KG	YS24-SS06-0410	3/50	0.0015 - 0.012	3.8E-03	N/A	8.2E+01 N	3.1E-01	SSL	NO	BSL
	56-23-5	Carbon tetrachloride	2.0E-03 J	2.0E-03 J	MG/KG	A06TP01-01	1/50	0.0015 - 0.012	2.0E-03	N/A	6.1E-01 C	1.7E-04	SSL	NO	BSL
	108-90-7	Chlorobenzene	1.0E-03 J	1.0E-03 J	MG/KG	A06SS16-00	1/50	0.001 - 0.012	1.0E-03	N/A	2.9E+01 N	6.2E-02	SSL	NO	BSL
	74-87-3	Chloromethane	5.7E-04 J	5.7E-04 J	MG/KG	YS24-SS20-0410	1/50	0.0015 - 0.012	5.7E-04	N/A	1.2E+01 N	4.9E-02	SSL	NO	BSL
	100-41-4	Ethylbenzene	1.6E-03 K	5.0E-03	MG/KG	YS24-SS08-0410	2/50	0.0015 - 0.012	5.0E-03	N/A	5.4E+00 C	1.7E-03	SSL	NO	BSL
	79-20-9	Methyl acetate	2.8E-03 J	2.1E+00 J	MG/KG	YS24-SS03-0410	21/29	0.0015 - 0.2	2.1E+00	N/A	7.8E+03 N	7.5E+00	SSL	NO	BSL
	75-09-2	Methylene chloride	1.3E-02	1.3E-02	MG/KG	A06TP03-01	1/50	0.0015 - 0.013	1.3E-02	N/A	1.1E+01 C	1.2E-03	SSL	NO	BSL
	100-42-5	Styrene	4.0E-05 J	4.0E-05 J	MG/KG	YS24-SS22-0410	1/50	0.0015 - 0.012	4.0E-05	N/A	6.3E+02 N	1.8E+00	SSL	NO	BSL
	108-88-3	Toluene	8.0E-04 J	6.0E-03 J	MG/KG	24SS04	5/50	0.0008 - 0.012	6.0E-03	N/A	5.0E+02 N	1.6E+00	SSL	NO	BSL
	1330-20-7	Xylene, total	1.0E-03 J	1.0E-03 J	MG/KG	24SS03 : A06TP01-01	2/50	0.001 - 0.012	1.0E-03	N/A	6.3E+01 N	2.0E-01	SSL	NO	BSL
	121-14-2	2,4-Dinitrotoluene	1.5E+00	1.5E+00	MG/KG	YS24-SS17-0410	1/50	0.25 - 1.5	1.5E+00	N/A	1.6E+00 C*	2.9E-04	SSL	NO	BSL
	91-58-7	2-Chloronaphthalene	6.6E-02 J	6.6E-02 J	MG/KG	YS24-SS11-0410	1/50	0.18 - 0.54	6.6E-02	N/A	1.8E+02 N	1.5E+01	SSL	NO	BSL
	106-47-8	4-Chloroaniline	1.8E-01 J	1.8E-01 J	MG/KG	A06SS11-00	1/50	0.18 - 0.54	1.8E-01	N/A	2.4E+00 C	1.4E-04	SSL	NO	BSL
	208-96-8	Acenaphthylene	2.6E-02 J	2.6E-02 J	MG/KG	YS24-SS31-0410	1/50	0.18 - 0.54	2.6E-02	N/A	3.4E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	3.5E-02 J	3.5E-02 J	MG/KG	YS24-SS31-0410	1/50	0.18 - 0.54	3.5E-02	N/A	1.7E+03 N	3.6E+02	SSL	NO	BSL
	100-52-7	Benzaldehyde	2.9E-02 J	2.9E-02 J	MG/KG	YS24-SS02-0410	1/29	0.094 - 0.23	2.9E-02	N/A	7.8E+02 N	8.1E-01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**3.2E-02 J**	**1.6E-01 J**	**MG/KG**	**YS24-SS31-0410**	**10/50**	**0.04 - 0.54**	**1.6E-01**	**N/A**	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**2.2E-02 J**	**1.8E-01 J**	**MG/KG**	**YS24-SS31-0410**	**12/50**	**0.04 - 0.54**	**1.8E-01**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**2.3E-02 K**	**2.5E-01**	**MG/KG**	**YS24-SS31-0410**	**13/50**	**0.046 - 0.54**	**2.5E-01**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.2E-02 J	8.7E-01 J	MG/KG	A06SS09-00	11/50	0.1 - 0.87	8.7E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**2.9E-02 J**	**3.0E-01**	**MG/KG**	**YS24-SS31-0410**	**12/50**	**0.05 - 0.54**	**3.0E-01**	**N/A**	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**CPAH**
	117-81-7	bis(2-Ethylhexyl)phthalate	4.1E-02 J	3.6E+00	MG/KG	A06SS11-00	14/50	0.05 - 3.6	3.6E+00	N/A	3.5E+01 C*	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	4.4E-02 J	7.8E-01	MG/KG	A06SS12-00D	4/50	0.18 - 0.78	7.8E-01	N/A	2.6E+02 C*	5.1E-01	SSL	NO	BSL
	218-01-9	**Chrysene**	**3.3E-02 J**	**2.6E-01**	**MG/KG**	**YS24-SS31-0410**	**11/50**	**0.058 - 0.54**	**2.6E-01**	**N/A**	**1.5E+01 C**	**1.1E+00**	**SSL**	**YES**	**CPAH**
	53-70-3	**Dibenz(a,h)anthracene**	**4.5E-02 J**	**4.5E-02 J**	**MG/KG**	**YS24-SS31-0410**	**1/50**	**0.18 - 0.54**	**4.5E-02**	**N/A**	**1.5E-02 C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	84-74-2	Di-n-butylphthalate	2.5E-02 J	4.6E+00	MG/KG	A06SS12-00D	16/50	0.042 - 4.6	4.6E+00	N/A	6.1E+02 N	9.2E+00	SSL	NO	BSL
	117-84-0	Di-n-octylphthalate	9.8E-02 J	4.5E-01	MG/KG	YS24-SS01P-0410	2/50	0.098 - 0.54	4.5E-01	N/A	3.5E+01 C*	N/A		NO	BSL
	206-44-0	Fluoranthene	2.3E-02 J	2.5E-01	MG/KG	YS24-SS31-0410	16/50	0.088 - 0.54	2.5E-01	N/A	2.3E+02 N	1.6E+02	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**6.3E-02 J**	**1.5E-01 J**	**MG/KG**	**YS24-SS31-0410**	**2/50**	**0.063 - 0.54**	**1.5E-01**	**N/A**	**1.5E-01 C**	**1.2E-01**	**SSL**	**YES**	**ASL**
	85-01-8	Phenanthrene	2.6E-02 J	8.8E-02 J	MG/KG	YS24-SS08-0410	15/50	0.064 - 0.54	8.8E-02	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	2.5E-02 J	3.3E-01	MG/KG	YS24-SS31-0410	18/50	0.057 - 0.54	3.3E-01	N/A	1.7E+02 N	1.2E+02	SSL	NO	BSL
	72-54-8	4,4'-DDD	5.4E-04 J	3.5E-02	MG/KG	A06SS11-00	4/50	0.00054 - 0.035	3.5E-02	N/A	2.0E+00 C	6.6E-02	SSL	NO	BSL
	72-55-9	4,4'-DDE	2.6E-04 J	1.1E-02 J	MG/KG	A06SS11-00	15/50	0.00026 - 0.011	1.1E-02	N/A	1.4E+00 C	4.7E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	5.8E-04 J	2.9E-02	MG/KG	A06SS11-00	13/50	0.00058 - 0.029	2.9E-02	N/A	1.7E+00 C*	6.7E-02	SSL	NO	BSL
	309-00-2	Aldrin	2.6E-04 J	4.7E-04 J	MG/KG	YS24-SS07-0410	4/50	0.0017 - 0.0099	4.7E-04	N/A	2.9E-02 C*	6.5E-04	SSL	NO	BSL
	319-84-6	alpha-BHC	2.9E-04 J	7.1E-04 J	MG/KG	YS24-SS16-0410	3/50	0.0017 - 0.0099	7.1E-04	N/A	7.7E-02 C	6.2E-05	SSL	NO	BSL

Table 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

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	5103-71-9	alpha-Chlordane	1.8E-04 J	7.4E-02 J	MG/KG	A06SS11-00	17/50	0.00042 - 0.074	7.4E-02	N/A	1.6E+00 C*	N/A		NO	BSL
Across Site	**11097-69-1**	**Aroclor-1254**	**5.9E-01**	**5.9E-01**	**MG/KG**	**A06TP03-01**	**1/50**	**0.018 - 0.59**	**5.9E-01**	**N/A**	**1.1E-01 C****	**8.8E-03**	**SSL**	**YES**	**ASL**
(cont'd)	11096-82-5	Aroclor-1260	1.9E-01 J	1.9E-01 J	MG/KG	A06TP03-01	1/50	0.018 - 0.19	1.9E-01	N/A	2.2E-01 C	2.4E-02	SSL	NO	BSL
	319-85-7	beta-BHC	7.7E-04 J	2.9E-03 J	MG/KG	YS24-SS15-0410	6/50	0.00093 - 0.0099	2.9E-03	N/A	2.7E-01 C	2.2E-04	SSL	NO	BSL
	319-86-8	delta-BHC	1.9E-04 J	9.7E-04 J	MG/KG	YS24-SS25-0410	10/50	0.00084 - 0.0099	9.7E-04	N/A	2.7E-01 C	N/A		NO	BSL
	60-57-1	Dieldrin	2.3E-04 J	6.6E-03 J	MG/KG	A06SS11-00	5/50	0.00023 - 0.0066	6.6E-03	N/A	3.0E-02 C	1.7E-04	SSL	NO	BSL
	959-98-8	Endosulfan I	2.0E-04 J	6.1E-04 J	MG/KG	YS24-SS25-0410	6/50	0.00038 - 0.0099	6.1E-04	N/A	3.7E+01 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	4.2E-04 J	5.2E-04 L	MG/KG	YS24-SS02-0410	2/50	0.0034 - 0.019	5.2E-04	N/A	3.7E+01 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	3.8E-04 J	1.5E-03 J	MG/KG	YS24-SS02-0410	3/50	0.0034 - 0.019	1.5E-03	N/A	3.7E+01 N	N/A		NO	BSL
	72-20-8	Endrin	4.1E-04 J	2.9E-02	MG/KG	A06TP03-01	5/50	0.0034 - 0.029	2.9E-02	N/A	1.8E+00 N	4.4E-01	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	4.1E-04 J	1.2E-03 J	MG/KG	YS24-SS31-0410	11/50	0.0034 - 0.019	1.2E-03	N/A	1.8E+00 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	4.4E-04 J	1.4E-03 J	MG/KG	YS24-SS02-0410	4/50	0.0034 - 0.019	1.4E-03	N/A	1.8E+00 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	2.8E-04 J	1.1E-03 J	MG/KG	YS24-SS18-0410	8/50	0.0017 - 0.0099	1.1E-03	N/A	5.2E-01 C*	3.6E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	2.4E-04 J	7.6E-02	MG/KG	A06SS11-00	17/50	0.00036 - 0.076	7.6E-02	N/A	1.6E+00 C*	N/A		NO	BSL
	76-44-8	Heptachlor	2.0E-04 J	9.4E-04 L	MG/KG	YS24-SS11P-0410	7/50	0.0017 - 0.0099	9.4E-04	N/A	1.1E-01 C	1.2E-03	SSL	NO	BSL
	1024-57-3	Heptachlor epoxide	1.8E-04 J	4.9E-04 L	MG/KG	YS24-SS02-0410	3/50	0.00018 - 0.0099	4.9E-04	N/A	5.3E-02 C*	1.5E-04	SSL	NO	BSL
	72-43-5	Methoxychlor	4.8E-03 J	4.8E-03 J	MG/KG	YS24-SS02-0410	1/50	0.0012 - 0.099	4.8E-03	N/A	3.1E+01 N	9.9E+00	SSL	NO	BSL
	7429-90-5	**Aluminum**	**1.8E+03**	**1.2E+04**	**MG/KG**	**YS24-SS28-0410**	**50/50**	**20.6 - 11600**	**1.2E+04**	**1.2E+04**	**7.7E+03 N**	**5.5E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	3.6E-01 J	1.1E+00 J	MG/KG	YS24-SS04-0410	15/47	0.79 - 2.9	1.1E+00	1.1E+01	3.1E+00 N	6.6E-01	SSL	NO	BSL
	7440-38-2	**Arsenic**	**6.4E-01**	**1.5E+02**	**MG/KG**	**YS24-SS31-0410**	**37/50**	**0.64 - 9.1**	**1.5E+02**	**6.4E+00**	**3.9E-01 C***	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.4E+01 J	1.1E+02	MG/KG	YS24-SS12-0410	50/50	13.6 - 73.8	1.1E+02	5.3E+01	1.5E+03 N	3.0E+02	SSL	NO	BSL
	7440-41-7	Beryllium	7.0E-02	2.4E+00	MG/KG	YS24-SS12-0410	42/50	0.04 - 0.67	2.4E+00	5.9E-01	1.6E+01 N	5.8E+01	SSL	NO	BSL
	7440-43-9	**Cadmium**	**5.0E-02 J**	**7.9E+02**	**MG/KG**	**A06TP03-01**	**35/50**	**0.06 - 786**	**7.9E+02**	**1.5E+00**	**7.0E+00 N**	**N/A**		**YES**	**ASL**
	7440-70-2	Calcium	1.2E+02	1.4E+05	MG/KG	YS24-SS08-0410	50/50	117 - 3120	1.4E+05	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**2.5E+00**	**2.5E+01 J**	**MG/KG**	**24SS04**	**50/50**	**1 - 24.6**	**2.5E+01**	**1.8E+01**	**2.9E-01 C**	**8.3E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**3.8E-01 J**	**9.0E+00**	**MG/KG**	**YS24-SS31-0410**	**50/50**	**0.52 - 6**	**9.0E+00**	**9.9E+00**	**2.3E+00 N**	**4.9E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.2E+00	1.4E+02	MG/KG	A06SS11-00	46/50	0.52 - 139	1.4E+02	4.3E+00	3.1E+02 N	5.1E+01	SSL	NO	BSL
	57-12-5	Cyanide	1.4E-01 L	2.7E+00 L	MG/KG	A06SS13-00	4/50	0.14 - 4.1	2.7E+00	2.7E+00	1.6E+02 N	7.4E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**1.5E+03**	**1.8E+04**	**MG/KG**	**YS24-SS06-0410**	**50/50**	**10.3 - 15100**	**1.8E+04**	**2.0E+04**	**5.5E+03 N**	**6.4E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	3.3E+00	3.4E+02	MG/KG	A06TP03-01	50/50	0.31 - 344	3.4E+02	1.7E+01	4.0E+02 N	N/A		NO	BSL
	7439-95-4	Magnesium	1.3E+02	2.0E+03	MG/KG	YS24-SS12-0410	50/50	133 - 1010	2.0E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**1.3E+01**	**9.6E+02**	**MG/KG**	**YS24-SS12-0410**	**50/50**	**1 - 171**	**9.6E+02**	**3.2E+02**	**1.8E+02 N**	**N/A**		**YES**	**ASL**
	7439-97-6	**Mercury**	**1.8E-02 J**	**4.7E+00**	**MG/KG**	**A06SS11-00**	**29/50**	**0.035 - 4.7**	**4.7E+00**	**1.1E-01**	**2.3E+00 N**	**3.3E-02**	**SSL**	**YES**	**ASL**
	7440-02-0	Nickel	1.2E+00	1.8E+01	MG/KG	A06TP03-01	50/50	0.52 - 17.8	1.8E+01	9.5E+00	1.5E+02 N	4.8E+01	SSL	NO	BSL
	7440-09-7	Potassium	1.5E+02 J	1.7E+03	MG/KG	YS24-SS06-0410	44/50	181 - 868	1.7E+03	7.1E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	5.8E-01 K	7.8E-01 K	MG/KG	A06SS12-00	4/50	0.52 - 0.92	7.8E-01	5.1E-01	3.9E+01 N	9.5E-01	SSL	NO	BSL
	7440-22-4	Silver	3.5E-01 J	8.8E+00	MG/KG	A06TP03-01	4/50	0.21 - 8.8	8.8E+00	2.1E+00	3.9E+01 N	1.6E+00	SSL	NO	BSL
	7440-23-5	Sodium	2.3E+01	1.3E+03	MG/KG	YS24-SS08-0410	45/50	22.9 - 675	1.3E+03	5.2E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	3.7E+00	3.4E+01	MG/KG	YS24-SS02-0410	50/50	2.1 - 28.9	3.4E+01	2.8E+01	3.9E+01 N	N/A	SSL	NO	BSL
	7440-66-6	Zinc	4.9E+00 J	1.2E+03	MG/KG	A06TP03-01	50/50	2.1 - 1190	1.2E+03	2.7E+01	2.3E+03 N	6.8E+02	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values are 95% UTL from Cheatham Annex/Yorktown background surface soil samples.
[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
RSL value for Acenaphthene used as surrogate for Acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic

Table 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

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

RSL value for dibutyl phthalate used as surrogate for di-n-octylphthalate.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) 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 Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
S - Concentration exceeds Csat, used Csat as screening value
SSL = Soil Screening Level for Protection of Groundwater, from RSL Table
MG/KG = milligrams per kilogram
N/A = Not applicable

[5] Rationale Codes

Selection Reason:	Above Screening Levels (ASL)
	Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)
Deletion Reason:	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

Table 2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

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
Emissions from Surface Soil Across Site	106-46-7	1,4-Dichlorobenzene	3.5E-03 J	3.5E-03 J	µg/m^3	A06SS13-00	1/50	N/A	3.5E-03	N/A	2.2E-01 C	N/A	N/A	NO	BSL
	78-93-3	2-Butanone	2.3E-04 J	2.2E-03 J	µg/m^3	YS24-SS02-0410	16/44	N/A	2.2E-03	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	67-64-1	Acetone	1.5E-04 J	1.5E-04 J	µg/m^3	A06SS12-00	1/50	N/A	1.5E-04	N/A	3.2E+03 N	N/A	N/A	NO	BSL
	71-43-2	Benzene	4.0E-05 K	4.8E-05 J	µg/m^3	YS24-SS08-0410	2/50	N/A	4.8E-05	N/A	3.1E-01 C	N/A	N/A	NO	BSL
	75-15-0	Carbon disulfide	4.3E-04 J	2.3E-03 K	µg/m^3	YS24-SS06-0410	3/50	N/A	2.3E-03	N/A	7.3E+02 N	N/A	N/A	NO	BSL
	56-23-5	Carbon tetrachloride	9.4E-04 J	9.4E-04 J	µg/m^3	A06TP01-01	1/50	N/A	9.4E-04	N/A	4.1E-01 C	N/A	N/A	NO	BSL
	108-90-7	Chlorobenzene	1.1E-04 J	1.1E-04 J	µg/m^3	A06SS16-00	1/50	N/A	1.1E-04	N/A	5.2E+01 N	N/A	N/A	NO	BSL
	74-87-3	Chloromethane	3.4E-04 J	3.4E-04 J	µg/m^3	YS24-SS20-0410	1/50	N/A	3.4E-04	N/A	9.4E+00 N	N/A	N/A	NO	BSL
	100-41-4	Ethylbenzene	2.0E-04 K	6.2E-04	µg/m^3	YS24-SS08-0410	2/50	N/A	6.2E-04	N/A	9.7E-01 C	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	2.4E-04 J	1.8E-01 J	µg/m^3	YS24-SS03-0410	21/29	N/A	1.8E-01	N/A	N/A	N/A	N/A	NO	NTX
	75-09-2	Methylene chloride	4.2E-03	4.2E-03	µg/m^3	A06TP03-01	1/50	N/A	4.2E-03	N/A	5.2E+00 C	N/A	N/A	NO	BSL
	100-42-5	Styrene	3.0E-06 J	3.0E-06 J	µg/m^3	YS24-SS22-0410	1/50	N/A	3.0E-06	N/A	1.0E+03 N	N/A	N/A	NO	BSL
	108-88-3	Toluene	1.3E-04 J	9.8E-04 J	µg/m^3	24SS04	5/50	N/A	9.8E-04	N/A	5.2E+03 N	N/A	N/A	NO	BSL
	1330-20-7	Xylene, total	1.2E-04 J	1.2E-04 J	µg/m^3	24SS03 : A06TP01-01	2/50	N/A	1.2E-04	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	121-14-2	2,4-Dinitrotoluene	1.1E-06	1.1E-06	µg/m^3	YS24-SS17-0410	1/50	N/A	1.1E-06	N/A	2.7E-02 C	N/A	N/A	NO	BSL
	91-58-7	2-Chloronaphthalene	3.8E-01 J	5.8E-04 J	µg/m^3	YS24-SS11-0410	1/50	N/A	5.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	106-47-8	4-Chloroaniline	1.3E-07 J	1.3E-07 J	µg/m^3	A06SS11-00	1/50	N/A	1.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	208-96-8	Acenaphthylene	1.9E-08 J	1.9E-08 J	µg/m^3	YS24-SS31-0410	1/50	N/A	1.9E-08	N/A	N/A	N/A	N/A	NO	NTX
	120-12-7	Anthracene	4.7E-05 J	4.7E-05 J	µg/m^3	YS24-SS31-0410	1/50	N/A	4.7E-05	N/A	N/A	N/A	N/A	NO	NTX
	100-52-7	Benzaldehyde	9.1E-04 J	9.1E-04 J	µg/m^3	YS24-SS02-0410	1/29	N/A	9.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	2.4E-08 J	1.2E-07 J	µg/m^3	YS24-SS31-0410	10/50	N/A	1.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	1.6E-08 J	1.3E-07 J	µg/m^3	YS24-SS31-0410	12/50	N/A	1.3E-07	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.7E-08 K	1.8E-07	µg/m^3	YS24-SS31-0410	13/50	N/A	1.8E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.6E-08 J	6.4E-07 J	µg/m^3	A06SS09-00	11/50	N/A	6.4E-07	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	2.1E-08 J	2.2E-07	µg/m^3	YS24-SS31-0410	12/50	N/A	2.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.0E-08 J	2.6E-06	µg/m^3	A06SS11-00	14/50	N/A	2.6E-06	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	3.2E-08 J	5.7E-07	µg/m^3	A06SS12-00D	4/50	N/A	5.7E-07	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	2.4E-08 J	1.9E-07	µg/m^3	YS24-SS31-0410	11/50	N/A	1.9E-07	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	3.3E-08 J	3.3E-08 J	µg/m^3	YS24-SS31-0410	1/50	N/A	3.3E-08	N/A	8.0E-04 C	N/A	N/A	NO	BSL
	84-74-2	Di-n-butylphthalate	1.8E-08 J	3.4E-06	µg/m^3	A06SS12-00D	16/50	N/A	3.4E-06	N/A	N/A	N/A	N/A	NO	NTX
	117-84-0	Di-n-octylphthalate	7.2E-08 J	3.3E-07	µg/m^3	YS24-SS01P-0410	2/50	N/A	3.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	1.7E-08 J	1.8E-07	µg/m^3	YS24-SS31-0410	16/50	N/A	1.8E-07	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	4.6E-08 J	1.1E-07 J	µg/m^3	YS24-SS31-0410	2/50	N/A	1.1E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	85-01-8	Phenanthrene	1.9E-08 J	6.5E-08 J	µg/m^3	YS24-SS08-0410	15/50	N/A	6.5E-08	N/A	N/A	N/A	N/A	NO	NTX
	129-00-0	Pyrene	7.4E-06 J	9.8E-05	µg/m^3	YS24-SS31-0410	18/50	N/A	9.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	72-54-8	4,4'-DDD	4.0E-10 J	2.6E-08	µg/m^3	A06SS11-00	4/50	N/A	2.6E-08	N/A	3.5E-02 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	1.9E-10 J	8.1E-09 J	µg/m^3	A06SS11-00	15/50	N/A	8.1E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	4.3E-10 J	2.1E-08	µg/m^3	A06SS11-00	13/50	N/A	2.1E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	309-00-2	Aldrin	1.9E-10 J	3.5E-10 J	µg/m^3	YS24-SS07-0410	4/50	N/A	3.5E-10	N/A	5.0E-04 C	N/A	N/A	NO	BSL
	319-84-6	alpha-BHC	2.1E-10 J	5.2E-10 J	µg/m^3	YS24-SS16-0410	3/50	N/A	5.2E-10	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	1.3E-10 J	5.4E-08 J	µg/m^3	A06SS11-00	17/50	N/A	5.4E-08	N/A	N/A	N/A	N/A	NO	NTX
	11097-69-1	Aroclor-1254	4.3E-07	4.3E-07	µg/m^3	A06TP03-01	1/50	N/A	4.3E-07	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	11096-82-5	Aroclor-1260	1.4E-07 J	1.4E-07 J	µg/m^3	A06TP03-01	1/50	N/A	1.4E-07	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	319-85-7	beta-BHC	5.7E-10 J	2.1E-09 J	µg/m^3	YS24-SS15-0410	6/50	N/A	2.1E-09	N/A	4.6E-03 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	1.4E-10 J	7.1E-10 J	µg/m^3	YS24-SS25-0410	10/50	N/A	7.1E-10	N/A	N/A	N/A	N/A	NO	NTX
	60-57-1	Dieldrin	1.7E-10 J	4.9E-09 J	µg/m^3	A06SS11-00	5/50	N/A	4.9E-09	N/A	5.3E-04 C	N/A	N/A	NO	BSL
	959-98-8	Endosulfan I	1.5E-10 J	4.5E-10 J	µg/m^3	YS24-SS25-0410	6/50	N/A	4.5E-10	N/A	N/A	N/A	N/A	NO	NTX
	33213-65-9	Endosulfan II	3.1E-10 J	3.8E-10 L	µg/m^3	YS24-SS02-0410	2/50	N/A	3.8E-10	N/A	N/A	N/A	N/A	NO	NTX

Table 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

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
Emissions from	1031-07-8	Endosulfan sulfate	2.8E-10 J	1.1E-09 J	µg/m^3	YS24-SS02-0410	3/50	N/A	1.1E-09	N/A	N/A	N/A	N/A	NO	NTX
Surface Soil	72-20-8	Endrin	3.0E-10 J	2.1E-08	µg/m^3	A06TP03-01	5/50	N/A	2.1E-08	N/A	N/A	N/A	N/A	NO	NTX
Across Site	7421-93-4	Endrin aldehyde	3.0E-10 J	8.8E-10 J	µg/m^3	YS24-SS31-0410	11/50	N/A	8.8E-10	N/A	N/A	N/A	N/A	NO	NTX
(cont'd)	53494-70-5	Endrin ketone	3.2E-10 J	1.0E-09 J	µg/m^3	YS24-SS02-0410	4/50	N/A	1.0E-09	N/A	N/A	N/A	N/A	NO	NTX
	58-89-9	gamma-BHC (Lindane)	2.1E-10 J	8.1E-10 J	µg/m^3	YS24-SS18-0410	8/50	N/A	8.1E-10	N/A	7.8E-03 C	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	1.8E-10 J	5.6E-08	µg/m^3	A06SS11-00	17/50	N/A	5.6E-08	N/A	N/A	N/A	N/A	NO	NTX
	76-44-8	Heptachlor	1.5E-10 J	6.9E-10 L	µg/m^3	YS24-SS11P-0410	7/50	N/A	6.9E-10	N/A	1.9E-03 C	N/A	N/A	NO	BSL
	1024-57-3	Heptachlor epoxide	1.3E-10 J	3.6E-10 L	µg/m^3	YS24-SS02-0410	3/50	N/A	3.6E-10	N/A	9.4E-04 C	N/A	N/A	NO	BSL
	72-43-5	Methoxychlor	3.5E-09 J	3.5E-09 J	µg/m^3	YS24-SS02-0410	1/50	N/A	3.5E-09	N/A	N/A	N/A	N/A	NO	NTX
	7429-90-5	Aluminum	1.3E-03	8.8E-03	µg/m^3	YS24-SS28-0410	50/50	N/A	8.8E-03	N/A	5.2E-01 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	2.6E-07 J	8.1E-07 J	µg/m^3	YS24-SS04-0410	15/47	N/A	8.1E-07	N/A	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	4.7E-07	1.1E-04	µg/m^3	YS24-SS31-0410	37/50	N/A	1.1E-04	N/A	5.7E-04 C*	N/A	N/A	NO	BSL
	7440-39-3	Barium	1.0E-05 J	8.3E-05	µg/m^3	YS24-SS12-0410	50/50	N/A	8.3E-05	N/A	5.2E-04 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	5.1E-08	1.8E-06	µg/m^3	YS24-SS12-0410	42/50	N/A	1.8E-06	N/A	1.0E-03 C*	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	3.7E-08 J	5.8E-04	µg/m^3	A06TP03-01	35/50	N/A	5.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	7440-70-2	Calcium	8.6E-05	1.0E-01	µg/m^3	YS24-SS08-0410	50/50	N/A	1.0E-01	N/A	N/A	N/A	N/A	NO	NUT
	7440-47-3	**Chromium**	**1.8E-06**	**1.8E-05 J**	**µg/m^3**	**24SS04**	**50/50**	**N/A**	**1.8E-05**	**N/A**	**1.1E-05 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	2.8E-07 J	6.6E-06	µg/m^3	YS24-SS31-0410	50/50	N/A	6.6E-06	N/A	2.7E-04 C*	N/A	N/A	NO	BSL
	7440-50-8	Copper	8.8E-07	1.0E-04	µg/m^3	A06SS11-00	46/50	N/A	1.0E-04	N/A	N/A	N/A	N/A	NO	NTX
	57-12-5	Cyanide	1.0E-07 L	2.0E-06 L	µg/m^3	A06SS13-00	4/50	N/A	2.0E-06	N/A	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	1.1E-03	1.3E-02	µg/m^3	YS24-SS06-0410	50/50	N/A	1.3E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	2.4E-06	2.5E-04	µg/m^3	A06TP03-01	50/50	N/A	2.5E-04	N/A	N/A	N/A	N/A	NO	NTX
	7439-95-4	Magnesium	9.8E-05	1.5E-03	µg/m^3	YS24-SS12-0410	50/50	N/A	1.5E-03	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	9.2E-06	7.1E-04	µg/m^3	YS24-SS12-0410	50/50	N/A	7.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	7439-97-6	Mercury	1.3E-08 J	3.5E-06	µg/m^3	A06SS11-00	29/50	N/A	3.5E-06	N/A	3.1E-04 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	8.8E-07	1.3E-05	µg/m^3	A06TP03-01	50/50	N/A	1.3E-05	N/A	9.4E-03 C*	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.1E-04 J	1.3E-03	µg/m^3	YS24-SS06-0410	44/50	N/A	1.3E-03	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	4.3E-07 K	5.7E-07 K	µg/m^3	A06SS12-00	4/50	N/A	5.7E-07	N/A	2.1E-02 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	2.6E-07 J	6.5E-06	µg/m^3	A06TP03-01	4/50	N/A	6.5E-06	N/A	N/A	N/A	N/A	NO	NTX
	7440-23-5	Sodium	1.7E-05	9.3E-04	µg/m^3	YS24-SS08-0410	45/50	N/A	9.3E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-62-2	Vanadium	2.7E-06	2.5E-05	µg/m^3	YS24-SS02-0410	50/50	N/A	2.5E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-66-6	Zinc	3.6E-06 J	8.8E-04	µg/m^3	A06TP03-01	50/50	N/A	8.8E-04	N/A	N/A	N/A	N/A	NO	NTX

[1] Minimum/Maximum calculated air concentrations from soil concentrations. Air concentrations calculated as Cair = Csoil*1000*(1/PEF+1/VF)
VF calculated for volatile and semi-volatile analytes identified as volatile in the Regional Screening Levels for Chemical Contaminants at Superfund Sites (Oak Ridge National Laboratory, June 2011). VF calculated on Table 2 Supplement. PEF = 1.36 x 10^9 m^3/kg.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Air.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10).
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) used as surrogate for chromium.
RSL value for Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[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
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
N = Noncarcinogenic
µg/m^3 = micrograms per cubic meter
N/A = Not applicable

Table 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: 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 Outside Waste Area	106-46-7	1,4-Dichlorobenzene	5.2E-02 J	5.2E-02 J	MG/KG	A06SS13-00	1/41	0.0015 - 0.39	5.2E-02	N/A	2.4E+00 C	4.1E-04	SSL	NO	BSL
	78-93-3	2-Butanone	4.0E-03 J	3.9E-02 J	MG/KG	YS24-SS02-0410	13/36	0.0037 - 0.016	3.9E-02	N/A	2.8E+03 N	1.5E+00	SSL	NO	BSL
	67-64-1	Acetone	3.0E-03 J	3.0E-03 J	MG/KG	A06SS12-00	1/41	0.003 - 0.016	3.0E-03	N/A	6.1E+03 N	4.5E+00	SSL	NO	BSL
	71-43-2	Benzene	2.0E-04 K	2.4E-04 J	MG/KG	YS24-SS08-0410	2/41	0.0015 - 0.012	2.4E-04	N/A	1.1E+00 C*	2.1E-04	SSL	NO	BSL
	75-15-0	Carbon disulfide	7.1E-04 J	3.8E-03 K	MG/KG	YS24-SS06-0410	3/41	0.0015 - 0.012	3.8E-03	N/A	8.2E+01 N	3.1E-01	SSL	NO	BSL
	108-90-7	Chlorobenzene	1.0E-03 J	1.0E-03 J	MG/KG	A06SS16-00	1/41	0.001 - 0.012	1.0E-03	N/A	2.9E+01 N	6.2E-02	SSL	NO	BSL
	100-41-4	Ethylbenzene	1.6E-03 K	5.0E-03	MG/KG	YS24-SS08-0410	2/41	0.0015 - 0.012	5.0E-03	N/A	5.4E+00 C	1.7E-03	SSL	NO	BSL
	79-20-9	Methyl acetate	4.4E-03	2.1E+00 J	MG/KG	YS24-SS03-0410	19/26	0.0015 - 0.2	2.1E+00	N/A	7.8E+03 N	7.5E+00	SSL	NO	BSL
	100-42-5	Styrene	4.0E-05 J	4.0E-05 J	MG/KG	YS24-SS22-0410	1/41	0.0015 - 0.012	4.0E-05	N/A	6.3E+02 N	1.8E+00	SSL	NO	BSL
	108-88-3	Toluene	8.0E-04 J	6.0E-03 J	MG/KG	24SS04	5/41	0.0008 - 0.012	6.0E-03	N/A	5.0E+02 N	1.6E+00	SSL	NO	BSL
	1330-20-7	Xylene, total	1.0E-03 J	1.0E-03 J	MG/KG	24SS03	1/41	0.0015 - 0.012	1.0E-03	N/A	6.3E+01 N	2.0E-01	SSL	NO	BSL
	121-14-2	2,4-Dinitrotoluene	1.5E+00	1.5E+00	MG/KG	YS24-SS17-0410	1/41	0.25 - 1.5	1.5E+00	N/A	1.6E+00 C*	2.9E-04	SSL	NO	BSL
	91-58-7	2-Chloronaphthalene	6.6E-02 J	6.6E-02 J	MG/KG	YS24-SS11-0410	1/41	0.18 - 0.39	6.6E-02	N/A	1.8E+02 N	1.5E+01	SSL	NO	BSL
	106-47-8	4-Chloroaniline	1.8E-01 J	1.8E-01 J	MG/KG	A06SS11-00	1/41	0.18 - 0.44	1.8E-01	N/A	2.4E+00 C	1.4E-04	SSL	NO	BSL
	208-96-8	Acenaphthylene	2.6E-02 J	2.6E-02 J	MG/KG	YS24-SS31-0410	1/41	0.18 - 0.39	2.6E-02	N/A	3.4E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	3.5E-02 J	3.5E-02 J	MG/KG	YS24-SS31-0410	1/41	0.18 - 0.39	3.5E-02	N/A	1.7E+03 N	3.6E+02	SSL	NO	BSL
	100-52-7	Benzaldehyde	2.9E-02 J	2.9E-02 J	MG/KG	YS24-SS02-0410	1/26	0.094 - 0.23	2.9E-02	N/A	7.8E+02 N	8.1E-01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**3.2E-02 J**	**1.6E-01 J**	**MG/KG**	**YS24-SS31-0410**	**10/41**	**0.04 - 0.39**	**1.6E-01**	**N/A**	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**2.2E-02 J**	**1.8E-01 J**	**MG/KG**	**YS24-SS31-0410**	**11/41**	**0.09 - 0.39**	**1.8E-01**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**2.3E-02 K**	**2.5E-01**	**MG/KG**	**YS24-SS31-0410**	**12/41**	**0.046 - 0.39**	**2.5E-01**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.2E-02 J	8.7E-01 J	MG/KG	A06SS09-00	9/41	0.18 - 0.87	8.7E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**3.1E-02 J**	**3.0E-01**	**MG/KG**	**YS24-SS31-0410**	**11/41**	**0.05 - 0.39**	**3.0E-01**	**N/A**	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**CPAH**
	117-81-7	bis(2-Ethylhexyl)phthalate	4.1E-02 J	3.6E+00	MG/KG	A06SS11-00	12/41	0.05 - 3.6	3.6E+00	N/A	3.5E+01 C*	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	4.4E-02 J	7.8E-01	MG/KG	A06SS12-00D	3/41	0.18 - 0.78	7.8E-01	N/A	2.6E+02 C*	5.1E-01	SSL	NO	BSL
	218-01-9	**Chrysene**	**3.3E-02 J**	**2.6E-01**	**MG/KG**	**YS24-SS31-0410**	**11/41**	**0.058 - 0.39**	**2.6E-01**	**N/A**	**1.5E+01 C**	**1.1E+00**	**SSL**	**YES**	**CPAH**
	53-70-3	**Dibenz(a,h)anthracene**	**4.5E-02 J**	**4.5E-02 J**	**MG/KG**	**YS24-SS31-0410**	**1/41**	**0.18 - 0.39**	**4.5E-02**	**N/A**	**1.5E-02 C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	84-74-2	Di-n-butylphthalate	2.5E-02 J	4.6E+00	MG/KG	A06SS12-00D	11/41	0.068 - 4.6	4.6E+00	N/A	6.1E+02 N	9.2E+00	SSL	NO	BSL
	117-84-0	Di-n-octylphthalate	9.8E-02 J	4.5E-01	MG/KG	YS24-SS01P-0410	2/41	0.098 - 0.39	4.5E-01	N/A	3.5E+01 C*	N/A		NO	BSL
	206-44-0	Fluoranthene	2.3E-02 J	2.5E-01	MG/KG	YS24-SS31-0410	16/41	0.088 - 0.39	2.5E-01	N/A	2.3E+02 N	1.6E+02	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**6.3E-02 J**	**1.5E-01 J**	**MG/KG**	**YS24-SS31-0410**	**2/41**	**0.063 - 0.39**	**1.5E-01**	**N/A**	**1.5E-01 C**	**1.2E-01**	**SSL**	**YES**	**ASL**
	85-01-8	Phenanthrene	2.6E-02 J	8.8E-02 J	MG/KG	YS24-SS08-0410	15/41	0.064 - 0.39	8.8E-02	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	3.1E-02 J	3.3E-01	MG/KG	YS24-SS31-0410	16/41	0.1 - 0.39	3.3E-01	N/A	1.7E+02 N	1.2E+02	SSL	NO	BSL
	72-54-8	4,4'-DDD	5.4E-04 J	3.5E-02	MG/KG	A06SS11-00	4/41	0.00054 - 0.035	3.5E-02	N/A	2.0E+00 C	6.6E-02	SSL	NO	BSL
	72-55-9	4,4'-DDE	2.6E-04 J	1.1E-02 J	MG/KG	A06SS11-00	14/41	0.00026 - 0.011	1.1E-02	N/A	1.4E+00 C	4.7E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	5.8E-04 J	2.9E-02	MG/KG	A06SS11-00	12/41	0.00058 - 0.029	2.9E-02	N/A	1.7E+00 C*	6.7E-02	SSL	NO	BSL
	309-00-2	Aldrin	2.6E-04 J	4.7E-04 J	MG/KG	YS24-SS07-0410	4/41	0.0017 - 0.0099	4.7E-04	N/A	2.9E-02 C*	6.5E-04	SSL	NO	BSL
	319-84-6	alpha-BHC	5.0E-04 J	7.1E-04 J	MG/KG	YS24-SS16-0410	2/41	0.0017 - 0.0099	7.1E-04	N/A	7.7E-02 C	6.2E-05	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	1.8E-04 J	7.4E-02 J	MG/KG	A06SS11-00	14/41	0.00042 - 0.074	7.4E-02	N/A	1.6E+00 C*	N/A		NO	BSL
	319-85-7	beta-BHC	7.7E-04 J	9.9E-04 J	MG/KG	YS24-SS18-0410 : YS24-SS21-0410	4/41	0.00093 - 0.0099	9.9E-04	N/A	2.7E-01 C	2.2E-04	SSL	NO	BSL
	319-86-8	delta-BHC	1.9E-04 J	9.7E-04 J	MG/KG	YS24-SS25-0410	9/41	0.0017 - 0.0099	9.7E-04	N/A	2.7E-01 C	N/A		NO	BSL
	60-57-1	Dieldrin	2.3E-04 J	6.6E-03 J	MG/KG	A06SS11-00	5/41	0.00023 - 0.0066	6.6E-03	N/A	3.0E-02 C	1.7E-04	SSL	NO	BSL
	959-98-8	Endosulfan I	2.0E-04 J	6.1E-04 J	MG/KG	YS24-SS25-0410	6/41	0.00038 - 0.0099	6.1E-04	N/A	3.7E+01 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	4.2E-04 J	5.2E-04 L	MG/KG	YS24-SS02-0410	2/41	0.0034 - 0.019	5.2E-04	N/A	3.7E+01 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	3.8E-04 J	1.5E-03 J	MG/KG	YS24-SS02-0410	3/41	0.0034 - 0.019	1.5E-03	N/A	3.7E+01 N	N/A		NO	BSL
	72-20-8	Endrin	4.1E-04 J	5.6E-04 J	MG/KG	YS24-SS25-0410	3/41	0.0034 - 0.019	5.6E-04	N/A	1.8E+00 N	4.4E-01	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	4.1E-04 J	1.2E-03 J	MG/KG	YS24-SS31-0410	11/41	0.0034 - 0.019	1.2E-03	N/A	1.8E+00 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	4.4E-04 J	1.4E-03 J	MG/KG	YS24-SS02-0410	4/41	0.0034 - 0.019	1.4E-03	N/A	1.8E+00 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	2.8E-04 J	1.1E-03 J	MG/KG	YS24-SS18-0410	7/41	0.0017 - 0.0099	1.1E-03	N/A	5.2E-01 C*	3.6E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	2.4E-04 J	7.6E-02	MG/KG	A06SS11-00	15/41	0.00036 - 0.076	7.6E-02	N/A	1.6E+00 C*	N/A		NO	BSL

Table 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: 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	76-44-8	Heptachlor	2.0E-04 J	9.4E-04 L	MG/KG	YS24-SS11P-0410	6/41	0.0017 - 0.0099	9.4E-04	N/A	1.1E-01 C	1.2E-03	SSL	NO	BSL
Outside	1024-57-3	Heptachlor epoxide	1.8E-04 J	4.9E-04 L	MG/KG	YS24-SS02-0410	3/41	0.00018 - 0.0099	4.9E-04	N/A	5.3E-02 C*	1.5E-04	SSL	NO	BSL
Waste Area	72-43-5	Methoxychlor	4.8E-03 J	4.8E-03 J	MG/KG	YS24-SS02-0410	1/41	0.0012 - 0.099	4.8E-03	N/A	3.1E+01 N	9.9E+00	SSL	NO	BSL
(cont'd)	**7429-90-5**	**Aluminum**	**1.8E+03**	**1.2E+04**	**MG/KG**	**YS24-SS28-0410**	**41/41**	**20.6 - 8870**	**1.2E+04**	**1.2E+04**	**7.7E+03 N**	**5.5E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	3.8E-01 J	1.1E+00 J	MG/KG	YS24-SS04-0410	12/41	0.79 - 2.8	1.1E+00	1.1E+01	3.1E+00 N	6.6E-01	SSL	NO	BSL
	7440-38-2	**Arsenic**	**6.4E-01**	**1.5E+02**	**MG/KG**	**YS24-SS31-0410**	**29/41**	**0.64 - 9.1**	**1.5E+02**	**6.4E+00**	**3.9E-01 C***	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.4E+01 J	1.1E+02	MG/KG	YS24-SS12-0410	41/41	13.6 - 51.3	1.1E+02	5.3E+01	1.5E+03 N	3.0E+02	SSL	NO	BSL
	7440-41-7	Beryllium	7.0E-02	2.4E+00	MG/KG	YS24-SS12-0410	34/41	0.04 - 0.67	2.4E+00	5.9E-01	1.6E+01 N	5.8E+01	SSL	NO	BSL
	7440-43-9	Cadmium	5.0E-02 J	4.3E+00	MG/KG	A06SS17-00	30/41	0.06 - 4.3	4.3E+00	1.5E+00	7.0E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	1.2E+02	1.4E+05	MG/KG	YS24-SS08-0410	41/41	117 - 3120	1.4E+05	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**2.5E+00**	**2.5E+01 J**	**MG/KG**	**24SS04**	**41/41**	**1 - 24.6**	**2.5E+01**	**1.8E+01**	**2.9E-01 C**	**8.3E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**3.8E-01 J**	**9.0E+00**	**MG/KG**	**YS24-SS31-0410**	**41/41**	**0.52 - 3.8**	**9.0E+00**	**9.9E+00**	**2.3E+00 N**	**4.9E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.2E+00	1.4E+02	MG/KG	A06SS11-00	37/41	0.52 - 139	1.4E+02	4.3E+00	3.1E+02 N	5.1E+01	SSL	NO	BSL
	57-12-5	Cyanide	1.4E-01 L	2.7E+00 L	MG/KG	A06SS13-00	4/41	0.14 - 2.9	2.7E+00	2.7E+00	1.6E+02 N	7.4E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**1.5E+03**	**1.8E+04**	**MG/KG**	**YS24-SS06-0410**	**41/41**	**10.3 - 15100**	**1.8E+04**	**2.0E+04**	**5.5E+03 N**	**6.4E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	3.3E+00	4.7E+01	MG/KG	YS24-SS17-0410	41/41	0.31 - 34.6	4.7E+01	1.7E+01	4.0E+02 N	N/A		NO	BSL
	7439-95-4	Magnesium	1.3E+02	2.0E+03	MG/KG	YS24-SS12-0410	41/41	133 - 1010	2.0E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**1.3E+01**	**9.6E+02**	**MG/KG**	**YS24-SS12-0410**	**41/41**	**1 - 145**	**9.6E+02**	**3.2E+02**	**1.8E+02 N**	**N/A**		**YES**	**ASL**
	7439-97-6	**Mercury**	**1.8E-02 J**	**4.7E+00**	**MG/KG**	**A06SS11-00**	**25/41**	**0.035 - 4.7**	**4.7E+00**	**1.1E-01**	**2.3E+00 N**	**3.3E-02**	**SSL**	**YES**	**ASL**
	7440-02-0	Nickel	1.2E+00	1.1E+01	MG/KG	YS24-SS12-0410	41/41	0.52 - 4.9	1.1E+01	9.5E+00	1.5E+02 N	4.8E+01	SSL	NO	BSL
	7440-09-7	Potassium	1.5E+02 J	1.7E+03	MG/KG	YS24-SS06-0410	36/41	181 - 868	1.7E+03	7.1E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	5.8E-01 K	7.8E-01 K	MG/KG	A06SS12-00	3/41	0.52 - 0.92	7.8E-01	5.1E-01	3.9E+01 N	9.5E-01	SSL	NO	BSL
	7440-22-4	Silver	3.5E-01 J	8.1E+00	MG/KG	A06SS11-00	2/41	0.21 - 8.1	8.1E+00	2.1E+00	3.9E+01 N	1.6E+00	SSL	NO	BSL
	7440-23-5	Sodium	2.3E+01	1.3E+03	MG/KG	YS24-SS08-0410	36/41	22.9 - 675	1.3E+03	5.2E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	3.7E+00	3.4E+01	MG/KG	YS24-SS02-0410	41/41	2.1 - 28.9	3.4E+01	2.8E+01	3.9E+01 N	N/A		NO	BSL
	7440-66-6	Zinc	4.9E+00 J	6.8E+01 J	MG/KG	A06SS15-00	41/41	2.1 - 68.3	6.8E+01	2.7E+01	2.3E+03 N	6.8E+02	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values are 95% UTL from Cheatham Annex/Yorktown background surface soil samples.
[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
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 technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) 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 Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.
[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)

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
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
S - Concentration exceeds Csat, used Csat as screening value
SSL = Soil Screening Level for Protection of Groundwater, from RSL Table
MG/KG = milligrams per kilogram
N/A = Not applicable

Table 2.6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

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
Emissions From Surface Soil Outside Waste Area	106-46-7	1,4-Dichlorobenzene	3.5E-03 J	3.5E-03 J	µg/m^3	A06SS13-00	1/41	N/A	3.5E-03	N/A	2.2E-01 C	N/A	N/A	NO	BSL
	78-93-3	2-Butanone	2.3E-04 J	2.2E-03 J	µg/m^3	YS24-SS02-0410	13/36	N/A	2.2E-03	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	67-64-1	Acetone	1.5E-04 J	1.5E-04 J	µg/m^3	A06SS12-00	1/41	N/A	1.5E-04	N/A	3.2E+03 N	N/A	N/A	NO	BSL
	71-43-2	Benzene	4.0E-05 K	4.8E-05 J	µg/m^3	YS24-SS08-0410	2/41	N/A	4.8E-05	N/A	3.1E-01 C	N/A	N/A	NO	BSL
	75-15-0	Carbon disulfide	4.3E-04 J	2.3E-03 K	µg/m^3	YS24-SS06-0410	3/41	N/A	2.3E-03	N/A	7.3E+01 N	N/A	N/A	NO	BSL
	108-90-7	Chlorobenzene	1.1E-04 J	1.1E-04 J	µg/m^3	A06SS16-00	1/41	N/A	1.1E-04	N/A	5.2E+00 N	N/A	N/A	NO	BSL
	100-41-4	Ethylbenzene	2.0E-04 K	6.2E-04	µg/m^3	YS24-SS08-0410	2/41	N/A	6.2E-04	N/A	9.7E-01 C	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	3.8E-04	1.8E-01 J	µg/m^3	YS24-SS03-0410	19/26	N/A	1.8E-01	N/A	N/A	N/A	N/A	NO	NTX
	100-42-5	Styrene	3.0E-06 J	3.0E-06 J	µg/m^3	YS24-SS22-0410	1/41	N/A	3.0E-06	N/A	1.0E+02 N	N/A	N/A	NO	BSL
	108-88-3	Toluene	1.3E-04 J	9.8E-04 J	µg/m^3	24SS04	5/41	N/A	9.8E-04	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	1330-20-7	Xylene, total	1.2E-04 J	1.2E-04 J	µg/m^3	24SS03	1/41	N/A	1.2E-04	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	121-14-2	2,4-Dinitrotoluene	1.1E-06	1.1E-06	µg/m^3	YS24-SS17-0410	1/41	N/A	1.1E-06	N/A	2.7E-02 C	N/A	N/A	NO	BSL
	91-58-7	2-Chloronaphthalene	5.8E-04 J	5.8E-04 J	µg/m^3	YS24-SS11-0410	1/41	N/A	5.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	106-47-8	4-Chloroaniline	1.3E-07 J	1.3E-07 J	µg/m^3	A06SS11-00	1/41	N/A	1.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	208-96-8	Acenaphthylene	1.9E-08 J	1.9E-08 J	µg/m^3	YS24-SS31-0410	1/41	N/A	1.9E-08	N/A	N/A	N/A	N/A	NO	NTX
	120-12-7	Anthracene	4.7E-05 J	4.7E-05 J	µg/m^3	YS24-SS31-0410	1/41	N/A	4.7E-05	N/A	N/A	N/A	N/A	NO	NTX
	100-52-7	Benzaldehyde	9.1E-04 J	9.1E-04 J	µg/m^3	YS24-SS02-0410	1/26	N/A	9.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	2.4E-08 J	1.2E-07 J	µg/m^3	YS24-SS31-0410	10/41	N/A	1.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	1.6E-08 J	1.3E-07 J	µg/m^3	YS24-SS31-0410	11/41	N/A	1.3E-07	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.7E-08 K	1.8E-07	µg/m^3	YS24-SS31-0410	12/41	N/A	1.8E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.6E-08 J	6.4E-07 J	µg/m^3	A06SS09-00	9/41	N/A	6.4E-07	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	2.3E-08 J	2.2E-07	µg/m^3	YS24-SS31-0410	11/41	N/A	2.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.0E-08 J	2.6E-06	µg/m^3	A06SS11-00	12/41	N/A	2.6E-06	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	3.2E-08 J	5.7E-07	µg/m^3	A06SS12-00D	3/41	N/A	5.7E-07	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	2.4E-08 J	1.9E-07	µg/m^3	YS24-SS31-0410	11/41	N/A	1.9E-07	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	3.3E-08 J	3.3E-08 J	µg/m^3	YS24-SS31-0410	1/41	N/A	3.3E-08	N/A	8.0E-04 C	N/A	N/A	NO	BSL
	84-74-2	Di-n-butylphthalate	1.8E-08 J	3.4E-06	µg/m^3	A06SS12-00D	11/41	N/A	3.4E-06	N/A	N/A	N/A	N/A	NO	NTX
	117-84-0	Di-n-octylphthalate	7.2E-08 J	3.3E-07	µg/m^3	YS24-SS01P-0410	2/41	N/A	3.3E-07	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	206-44-0	Fluoranthene	1.7E-08 J	1.8E-07	µg/m^3	YS24-SS31-0410	16/41	N/A	1.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	193-39-5	Indeno(1,2,3-cd)pyrene	4.6E-08 J	1.1E-07 J	µg/m^3	YS24-SS31-0410	2/41	N/A	1.1E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	85-01-8	Phenanthrene	1.9E-08 J	6.5E-08 J	µg/m^3	YS24-SS08-0410	15/41	N/A	6.5E-08	N/A	N/A	N/A	N/A	NO	NTX
	129-00-0	Pyrene	9.2E-06 J	9.8E-05	µg/m^3	YS24-SS31-0410	16/41	N/A	9.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	72-54-8	4,4'-DDD	4.0E-10 J	2.6E-08	µg/m^3	A06SS11-00	4/41	N/A	2.6E-08	N/A	3.5E-02 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	1.9E-10 J	8.1E-09 J	µg/m^3	A06SS11-00	14/41	N/A	8.1E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	4.3E-10 J	2.1E-08	µg/m^3	A06SS11-00	12/41	N/A	2.1E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	309-00-2	Aldrin	1.9E-10 J	3.5E-10 J	µg/m^3	YS24-SS07-0410	4/41	N/A	3.5E-10	N/A	5.0E-04 C	N/A	N/A	NO	BSL
	319-84-6	alpha-BHC	3.7E-10 J	5.2E-10 J	µg/m^3	YS24-SS16-0410	2/41	N/A	5.2E-10	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	1.3E-10 J	5.4E-08 J	µg/m^3	A06SS11-00	14/41	N/A	5.4E-08	N/A	2.4E-02 C*	N/A	N/A	NO	BSL
	319-85-7	beta-BHC	5.7E-10 J	7.3E-10 J	µg/m^3	YS24-SS18-0410 : YS24-SS21-0410	4/41	N/A	7.3E-10	N/A	4.6E-03 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	1.4E-10 J	7.1E-10 J	µg/m^3	YS24-SS25-0410	9/41	N/A	7.1E-10	N/A	4.8E-03 C	N/A	N/A	NO	BSL
	60-57-1	Dieldrin	1.7E-10 J	4.9E-09 J	µg/m^3	A06SS11-00	5/41	N/A	4.9E-09	N/A	5.3E-04 C	N/A	N/A	NO	BSL
	959-98-8	Endosulfan I	1.5E-10 J	4.5E-10 J	µg/m^3	YS24-SS25-0410	6/41	N/A	4.5E-10	N/A	N/A	N/A	N/A	NO	NTX
	33213-65-9	Endosulfan II	3.1E-10 J	3.8E-10 L	µg/m^3	YS24-SS02-0410	2/41	N/A	3.8E-10	N/A	N/A	N/A	N/A	NO	NTX
	1031-07-8	Endosulfan sulfate	2.8E-10 J	1.1E-09 J	µg/m^3	YS24-SS02-0410	3/41	N/A	1.1E-09	N/A	N/A	N/A	N/A	NO	NTX
	72-20-8	Endrin	3.0E-10 J	4.1E-10 J	µg/m^3	YS24-SS25-0410	3/41	N/A	4.1E-10	N/A	N/A	N/A	N/A	NO	NTX
	7421-93-4	Endrin aldehyde	3.0E-10 J	8.8E-10 J	µg/m^3	YS24-SS31-0410	11/41	N/A	8.8E-10	N/A	N/A	N/A	N/A	NO	NTX
	53494-70-5	Endrin ketone	3.2E-10 J	1.0E-09 J	µg/m^3	YS24-SS02-0410	4/41	N/A	1.0E-09	N/A	N/A	N/A	N/A	NO	NTX
	58-89-9	gamma-BHC (Lindane)	2.1E-10 J	8.1E-10 J	µg/m^3	YS24-SS18-0410	7/41	N/A	8.1E-10	N/A	7.8E-03 C	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	1.8E-10 J	5.6E-08	µg/m^3	A06SS11-00	15/41	N/A	5.6E-08	N/A	2.4E-02 C*	N/A	N/A	NO	BSL

Table 2.6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

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
Emissions From	76-44-8	Heptachlor	1.5E-10 J	6.9E-10 L	µg/m^3	YS24-SS11P-0410	6/41	N/A	6.9E-10	N/A	1.9E-03 C	N/A	N/A	NO	BSL
Surface Soil	1024-57-3	Heptachlor epoxide	1.3E-10 J	3.6E-10 L	µg/m^3	YS24-SS02-0410	3/41	N/A	3.6E-10	N/A	9.4E-04 C	N/A	N/A	NO	BSL
Outside	72-43-5	Methoxychlor	3.5E-09 J	3.5E-09 J	µg/m^3	YS24-SS02-0410	1/41	N/A	3.5E-09	N/A	N/A	N/A	N/A	NO	NTX
Waste Area	7429-90-5	Aluminum	1.3E-03	8.8E-03	µg/m^3	YS24-SS28-0410	41/41	N/A	8.8E-03	1.2E+04	5.2E-01 N	N/A	N/A	NO	BSL
(cont'd)	7440-36-0	Antimony	2.8E-07 J	8.1E-07 J	µg/m^3	YS24-SS04-0410	12/41	N/A	8.1E-07	1.1E+01	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	4.7E-07	1.1E-04	µg/m^3	YS24-SS31-0410	29/41	N/A	1.1E-04	6.4E+00	5.7E-04 C*	N/A	N/A	NO	BSL
	7440-39-3	Barium	1.0E-05 J	8.3E-05	µg/m^3	YS24-SS12-0410	41/41	N/A	8.3E-05	5.3E+01	5.2E-02 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	5.1E-08	1.8E-06	µg/m^3	YS24-SS12-0410	34/41	N/A	1.8E-06	5.9E-01	1.0E-03 C*	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	3.7E-08 J	3.2E-06	µg/m^3	A06SS17-00	30/41	N/A	3.2E-06	1.5E+00	1.4E-03 C*	N/A	N/A	NO	BSL
	7440-70-2	Calcium	8.6E-05	1.0E-01	µg/m^3	YS24-SS08-0410	41/41	N/A	1.0E-01	2.3E+03	N/A	N/A	N/A	NO	NUT
	7440-47-3	**Chromium**	1.8E-06	**1.8E-05 J**	µg/m^3	**24SS04**	**41/41**	**N/A**	**1.8E-05**	**1.8E+01**	**1.1E-05 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	2.8E-07 J	6.6E-06	µg/m^3	YS24-SS31-0410	41/41	N/A	6.6E-06	9.9E+00	2.7E-04 C*	N/A	N/A	NO	BSL
	7440-50-8	Copper	8.8E-07	1.0E-04	µg/m^3	A06SS11-00	37/41	N/A	1.0E-04	4.3E+00	N/A	N/A	N/A	NO	NTX
	57-12-5	Cyanide	1.0E-07 L	2.0E-06 L	µg/m^3	A06SS13-00	4/41	N/A	2.0E-06	2.7E+00	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	1.1E-03	1.3E-02	µg/m^3	YS24-SS06-0410	41/41	N/A	1.3E-02	2.0E+04	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	2.4E-06	3.4E-05	µg/m^3	YS24-SS17-0410	41/41	N/A	3.4E-05	1.7E+01	N/A	N/A	N/A	NO	NTX
	7439-95-4	Magnesium	9.8E-05	1.5E-03	µg/m^3	YS24-SS12-0410	41/41	N/A	1.5E-03	1.1E+03	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	9.2E-06	7.1E-04	µg/m^3	YS24-SS12-0410	41/41	N/A	7.1E-04	3.2E+02	5.2E-03 N	N/A	N/A	NO	BSL
	7439-97-6	Mercury	1.3E-08 J	3.5E-06	µg/m^3	A06SS11-00	25/41	N/A	3.5E-06	1.1E-01	3.1E-03 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	8.8E-07	7.7E-06	µg/m^3	YS24-SS12-0410	41/41	N/A	7.7E-06	9.5E+00	9.4E-03 C*	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.1E-04 J	1.3E-03	µg/m^3	YS24-SS06-0410	36/41	N/A	1.3E-03	7.1E+02	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	4.3E-07 K	5.7E-07 K	µg/m^3	A06SS12-00	3/41	N/A	5.7E-07	5.1E-01	2.1E+00 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	2.6E-07 J	6.0E-06	µg/m^3	A06SS11-00	2/41	N/A	6.0E-06	2.1E+00	N/A	N/A	N/A	NO	NTX
	7440-23-5	Sodium	1.7E-05	9.3E-04	µg/m^3	YS24-SS08-0410	36/41	N/A	9.3E-04	5.2E+02	N/A	N/A	N/A	NO	NUT
	7440-62-2	Vanadium	2.7E-06	2.5E-05	µg/m^3	YS24-SS02-0410	41/41	N/A	2.5E-05	2.8E+01	N/A	N/A	N/A	NO	NTX
	7440-66-6	Zinc	3.6E-06 J	5.0E-05 J	µg/m^3	A06SS15-00	41/41	N/A	5.0E-05	2.7E+01	N/A	N/A	N/A	NO	NTX

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are 95% UTL from Cheatham Annex/Yorktown background surface soil samples.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
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 technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) 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 Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)

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
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
S - Concentration exceeds Csat, used Csat as screening value
µg/m^3 = micrograms per cubic meter
N/A = Not applicable

Table 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: 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
Soil* in Sludge Area	78-93-3	2-Butanone	5.5E-03 K	5.5E-03 K	MG/KG	YS24-SS10-0410	1/3	0.0079 - 0.009	5.5E-03	N/A	2.8E+03 N	1.5E+00	SSL	NO	BSL
	74-87-3	Chloromethane	3.9E-04 K	3.9E-04 K	MG/KG	YS24-SS10-0410	1/3	0.0032 - 0.0036	3.9E-04	N/A	1.2E+01 N	4.9E-02	SSL	NO	BSL
	79-20-9	Methyl acetate	3.9E-03 K	1.8E-02 K	MG/KG	YS24-SS09-0410	2/3	0.0032 - 0.0036	1.8E-02	N/A	7.8E+03 N	7.5E+00	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	4.9E-02 J	5.6E-02 J	MG/KG	YS24-SS10-0410	2/3	0.18 - 0.19	5.6E-02	N/A	3.1E+01 N	7.5E-01	SSL	NO	BSL
	205-99-2	Benzo(b)fluoranthene	3.1E-02 J	4.6E-02 J	MG/KG	YS24-SS09-0410	2/3	0.18 - 0.19	4.6E-02	N/A	1.5E-01 C	3.5E-02	SSL	NO	BSL
	218-01-9	Chrysene	5.2E-02 J	8.7E-02 J	MG/KG	YS24-SS09-0410	2/3	0.18 - 0.19	8.7E-02	N/A	1.5E+01 C	1.1E+00	SSL	NO	BSL
	132-64-9	Dibenzofuran	2.6E-02 J	2.6E-02 J	MG/KG	YS24-SS09-0410	1/3	0.18 - 0.19	2.6E-02	N/A	7.8E+00 N	6.8E-01	SSL	NO	BSL
	206-44-0	Fluoranthene	2.6E-02 J	4.2E-02 J	MG/KG	YS24-SS09-0410	2/3	0.18 - 0.19	4.2E-02	N/A	2.3E+02 N	1.6E+02	SSL	NO	BSL
	91-20-3	Naphthalene	3.3E-02 J	4.2E-02 J	MG/KG	YS24-SS10-0410	2/3	0.18 - 0.19	4.2E-02	N/A	3.6E+00 C*	4.7E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	3.7E-02 J	8.4E-02 J	MG/KG	YS24-SS09-0410	2/3	0.18 - 0.19	8.4E-02	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	2.9E-02 J	5.2E-02 J	MG/KG	YS24-SS09-0410	2/3	0.18 - 0.19	5.2E-02	N/A	1.7E+02 N	1.2E+02	SSL	NO	BSL
	72-54-8	4,4'-DDD	4.7E-04 J	4.9E-04 J	MG/KG	YS24-SS09-0410	2/3	0.0036 - 0.0036	4.9E-04	N/A	2.0E+00 C	6.6E-02	SSL	NO	BSL
	72-55-9	4,4'-DDE	1.4E-03 J	1.7E-03 J	MG/KG	YS24-SS09-0410	2/3	0.0036 - 0.0036	1.7E-03	N/A	1.4E+00 C	4.7E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	1.8E-03 J	3.2E-03 J	MG/KG	YS24-SS10-0410	2/3	0.0036 - 0.0036	3.2E-03	N/A	1.7E+00 C*	6.7E-02	SSL	NO	BSL
	319-84-6	alpha-BHC	4.0E-04 J	4.0E-04 J	MG/KG	YS24-SS09-0410	1/3	0.0018 - 0.0019	4.0E-04	N/A	7.7E-02 C	6.2E-05	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	1.2E-03 J	1.2E-03 J	MG/KG	YS24-SS09-0410	1/3	0.0018 - 0.0019	1.2E-03	N/A	1.6E+00 C*	N/A		NO	BSL
	319-85-7	beta-BHC	1.6E-03 J	1.6E-03 J	MG/KG	YS24-SS09-0410	1/3	0.0018 - 0.0019	1.6E-03	N/A	2.7E-01 C	2.2E-04	SSL	NO	BSL
	319-86-8	delta-BHC	4.5E-04 J	4.5E-04 J	MG/KG	YS24-SS09-0410	1/3	0.0018 - 0.0019	4.5E-04	N/A	2.7E-01 C	N/A		NO	BSL
	959-98-8	Endosulfan I	4.9E-04 J	4.9E-04 J	MG/KG	YS24-SS09-0410	1/3	0.0018 - 0.0019	4.9E-04	N/A	3.7E+01 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	5.5E-04 J	5.5E-04 J	MG/KG	YS24-SS10-0410	1/3	0.0036 - 0.0036	5.5E-04	N/A	3.7E+01 N	N/A		NO	BSL
	72-20-8	Endrin	5.9E-04 J	5.9E-04 J	MG/KG	YS24-SS09-0410	1/3	0.0036 - 0.0036	5.9E-04	N/A	1.8E+00 N	4.4E-01	SSL	NO	BSL
	53494-70-5	Endrin ketone	1.3E-03 J	1.7E-03 J	MG/KG	YS24-SS09-0410	2/3	0.0036 - 0.0036	1.7E-03	N/A	1.8E+00 N	N/A		NO	BSL
	76-44-8	Heptachlor	3.5E-04 J	3.5E-04 J	MG/KG	YS24-SS09-0410	1/3	0.0018 - 0.0019	3.5E-04	N/A	1.1E-01 C	1.2E-03	SSL	NO	BSL
	1024-57-3	Heptachlor epoxide	4.2E-04 J	4.2E-04 J	MG/KG	YS24-SS09-0410	1/3	0.0018 - 0.0019	4.2E-04	N/A	5.3E-02 C*	1.5E-04	SSL	NO	BSL
	7429-90-5	Aluminum	3.6E+03	4.6E+03	MG/KG	YS24-SS10-0410	3/3	21.2 - 21.8	4.6E+03	1.3E+04	7.7E+03 N	5.5E+04	SSL	NO	BSL
	7440-39-3	Barium	2.3E+01	2.9E+01	MG/KG	YS24-SB09-0_5-2-0410	3/3	21.2 - 21.8	2.9E+01	8.5E+01	1.5E+03 N	3.0E+02	SSL	NO	BSL
	7440-41-7	Beryllium	3.0E-01 J	5.3E-01 J	MG/KG	YS24-SS10-0410	2/3	0.53 - 0.55	5.3E-01	5.9E-01	1.6E+01 N	5.8E+01	SSL	NO	BSL
	7440-43-9	Cadmium	4.0E-02 J	4.0E-02 J	MG/KG	YS24-SB09-0_5-2-0410	1/3	0.53 - 0.55	4.0E-02	1.5E+00	7.0E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	1.0E+02 J	1.4E+02 J	MG/KG	YS24-SS09-0410	3/3	529 - 545	1.4E+02	2.4E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**6.2E+00**	**6.9E+00**	**MG/KG**	**YS24-SB09-0_5-2-0410**	**3/3**	**1.1 - 1.1**	**6.9E+00**	**3.4E+01**	**2.9E-01 C**	**8.3E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**2.9E+00**	**8.7E+00**	**MG/KG**	**YS24-SS10-0410**	**3/3**	**0.53 - 0.55**	**8.7E+00**	**9.9E+00**	2.3E+00 N	4.9E-01	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	2.8E+00	6.5E+00	MG/KG	YS24-SS09-0410	3/3	0.53 - 0.55	6.5E+00	4.3E+00	3.1E+02 N	5.1E+01	SSL	NO	BSL
	7439-89-6	**Iron**	**4.7E+03**	**5.8E+03**	**MG/KG**	**YS24-SB09-0_5-2-0410**	**3/3**	**10.6 - 10.9**	**5.8E+03**	**3.2E+04**	5.5E+03 N	6.4E+02	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	7.7E+00	1.2E+01	MG/KG	YS24-SS09-0410	3/3	0.32 - 0.33	1.2E+01	1.7E+01	4.0E+02 N	N/A		NO	BSL
	7439-95-4	Magnesium	3.0E+02 J	3.0E+02 J	MG/KG	B09-0_5-2-0410 : YS24-SS0	3/3	529 - 545	3.0E+02	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**7.7E+01**	**2.5E+02**	**MG/KG**	**YS24-SS10-0410**	**3/3**	**1.1 - 1.1**	**2.5E+02**	**3.2E+02**	1.8E+02 N	N/A		**YES**	**ASL**
	7440-02-0	Nickel	3.9E+00	6.0E+00	MG/KG	YS24-SS10-0410	3/3	0.53 - 0.55	6.0E+00	1.8E+01	1.5E+02 N	4.8E+01	SSL	NO	BSL

Table 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: 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
	7440-09-7	Potassium	2.2E+02 J	2.4E+02 J	MG/KG	YS24-SB09-0_5-2-0410	3/3	529 - 545	2.4E+02	9.0E+02	N/A	N/A		NO	NUT
	7440-23-5	Sodium	9.0E+01 J	1.1E+02 J	MG/KG	YS24-SB09-0_5-2-0410	3/3	529 - 545	1.1E+02	8.1E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	8.8E+00	1.1E+01	MG/KG	YS24-SS09-0410	3/3	2.1 - 2.2	1.1E+01	4.8E+01	3.9E+01 N	N/A	SSL	NO	BSL
	7440-66-6	Zinc	1.1E+01	2.6E+01	MG/KG	YS24-SS10-0410	3/3	2.1 - 2.2	2.6E+01	2.8E+01	2.3E+03 N	6.8E+02	SSL	NO	BSL

* Surface soil & subsurface soil combined

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values from Cheatham Annex/Yorktown background surface and subsurface soil samples; values represent the > 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for Chromium(VI) 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 Manganese (non-diet) used as surrogate for manganese.
RSL value for endosulfan used as surrogate for endosulfan I and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)

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
K = Biased High
C = Carcinogenic
C* = C screening value used as screening level
N = Noncarcinogenic
SSL = Soil Screening Level for Protection of Groundwater, from RSL Table
S = Concentration exceeds Csat, used Csat as screening value
MG/KG = milligrams per kilogram
N/A = Not applicable

Table 2.8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: Air

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
Emissions from Soil* in Sludge Area	78-93-3	2-Butanone	3.2E-04 K	3.2E-04 K	µg/m^3	YS24-SS10-0410	1/3	N/A	3.2E-04	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	74-87-3	Chloromethane	2.3E-04 K	2.3E-04 K	µg/m^3	YS24-SS10-0410	1/3	N/A	2.3E-04	N/A	9.4E+00 N	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	3.4E-04 K	1.6E-03 K	µg/m^3	YS24-SS09-0410	2/3	N/A	1.6E-03	N/A	N/A	N/A	N/A	NO	NTX
	91-57-6	2-Methylnaphthalene	5.9E-04 J	6.8E-04 J	µg/m^3	YS24-SS10-0410	2/3	N/A	6.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	205-99-2	Benzo(b)fluoranthene	2.3E-08 J	3.4E-08 J	µg/m^3	YS24-SS09-0410	2/3	N/A	3.4E-08	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	218-01-9	Chrysene	3.8E-08 J	6.4E-08 J	µg/m^3	YS24-SS09-0410	2/3	N/A	6.4E-08	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	132-64-9	Dibenzofuran	9.3E-05 J	9.3E-05 J	µg/m^3	YS24-SS09-0410	1/3	N/A	9.3E-05	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	1.9E-08 J	3.1E-08 J	µg/m^3	YS24-SS09-0410	2/3	N/A	3.1E-08	N/A	N/A	N/A	N/A	NO	NTX
	91-20-3	Naphthalene	5.0E-04 J	6.4E-04 J	µg/m^3	YS24-SS10-0410	2/3	N/A	6.4E-04	N/A	7.2E-02 C*	N/A	N/A	NO	BSL
	85-01-8	Phenanthrene	2.7E-08 J	6.2E-08 J	µg/m^3	YS24-SS09-0410	2/3	N/A	6.2E-08	N/A	N/A	N/A	N/A	NO	NTX
	129-00-0	Pyrene	8.6E-06 J	1.5E-05 J	µg/m^3	YS24-SS09-0410	2/3	N/A	1.5E-05	N/A	N/A	N/A	N/A	NO	NTX
	72-54-8	4,4'-DDD	3.5E-10 J	3.6E-10 J	µg/m^3	YS24-SS09-0410	2/3	N/A	3.6E-10	N/A	3.5E-02 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	1.0E-09 J	1.3E-09 J	µg/m^3	YS24-SS09-0410	2/3	N/A	1.3E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	1.3E-09 J	2.4E-09 J	µg/m^3	YS24-SS10-0410	2/3	N/A	2.4E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	319-84-6	alpha-BHC	2.9E-10 J	2.9E-10 J	µg/m^3	YS24-SS09-0410	1/3	N/A	2.9E-10	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	8.8E-10 J	8.8E-10 J	µg/m^3	YS24-SS09-0410	1/3	N/A	8.8E-10	N/A	N/A	N/A	N/A	NO	NTX
	319-85-7	beta-BHC	1.2E-09 J	1.2E-09 J	µg/m^3	YS24-SS09-0410	1/3	N/A	1.2E-09	N/A	4.6E-03 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	3.3E-10 J	3.3E-10 J	µg/m^3	YS24-SS09-0410	1/3	N/A	3.3E-10	N/A	N/A	N/A	N/A	NO	NTX
	959-98-8	Endosulfan I	3.6E-10 J	3.6E-10 J	µg/m^3	YS24-SS09-0410	1/3	N/A	3.6E-10	N/A	N/A	N/A	N/A	NO	NTX
	1031-07-8	Endosulfan sulfate	4.0E-10 J	4.0E-10 J	µg/m^3	YS24-SS10-0410	1/3	N/A	4.0E-10	N/A	N/A	N/A	N/A	NO	NTX
	72-20-8	Endrin	4.3E-10 J	4.3E-10 J	µg/m^3	YS24-SS09-0410	1/3	N/A	4.3E-10	N/A	N/A	N/A	N/A	NO	NTX
	53494-70-5	Endrin ketone	9.6E-10 J	1.3E-09 J	µg/m^3	YS24-SS09-0410	2/3	N/A	1.3E-09	N/A	N/A	N/A	N/A	NO	NTX
	76-44-8	Heptachlor	2.6E-10 J	2.6E-10 J	µg/m^3	YS24-SS09-0410	1/3	N/A	2.6E-10	N/A	1.9E-03 C	N/A	N/A	NO	BSL
	1024-57-3	Heptachlor epoxide	3.1E-10 J	3.1E-10 J	µg/m^3	YS24-SS09-0410	1/3	N/A	3.1E-10	N/A	9.4E-04 C	N/A	N/A	NO	BSL
	7429-90-5	Aluminum	2.7E-03	3.4E-03	µg/m^3	YS24-SB10-5-6-0410	3/3	N/A	3.4E-03	N/A	5.2E-01 N	N/A	N/A	NO	BSL
	7440-39-3	Barium	1.7E-05 J	2.1E-05	µg/m^3	YS24-SB09-0_5-2-0410	3/3	N/A	2.1E-05	N/A	5.2E-04 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	2.2E-07 J	3.9E-07 J	µg/m^3	YS24-SS10-0410	2/3	N/A	3.9E-07	N/A	1.0E-03 C*	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	2.9E-08 J	2.9E-08 J	µg/m^3	YS24-SB09-0_5-2-0410	1/3	N/A	2.9E-08	N/A	N/A	N/A	N/A	NO	NTX
	7440-70-2	Calcium	7.5E-05 J	1.1E-04	µg/m^3	YS24-SB10-5-6-0410	3/3	N/A	1.1E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-47-3	Chromium	4.6E-06	5.1E-06	µg/m^3	YS24-SB10-5-6-0410	3/3	N/A	5.1E-06	N/A	1.1E-05 C	N/A	N/A	NO	BSL
	7440-48-4	Cobalt	2.1E-06	6.4E-06	µg/m^3	YS24-SS10-0410	**3/3**	N/A	6.4E-06	N/A	2.7E-04 C*	N/A	N/A	NO	BSL
	7440-50-8	Copper	2.1E-06	4.8E-06	µg/m^3	YS24-SB10-5-6-0410	3/3	N/A	4.8E-06	N/A	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	3.4E-03	4.3E-03	µg/m^3	YS24-SB10-5-6-0410	**3/3**	N/A	4.3E-03	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	5.7E-06	9.1E-06	µg/m^3	YS24-SS09-0410	3/3	N/A	9.1E-06	N/A	N/A	N/A	N/A	NO	NTX
	7439-95-4	Magnesium	2.2E-04 J	2.2E-04	µg/m^3	YS24-SB10-5-6-0410	3/3	N/A	2.2E-04	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	5.6E-05	1.8E-04	µg/m^3	YS24-SS10-0410	**3/3**	N/A	1.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	7440-02-0	Nickel	2.9E-06	4.4E-06	µg/m^3	YS24-SS10-0410	3/3	N/A	4.4E-06	N/A	9.4E-03 C*	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.6E-04 J	1.8E-04	µg/m^3	YS24-SB10-5-6-0410	3/3	N/A	1.8E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-23-5	Sodium	6.6E-05 J	7.8E-05 J	µg/m^3	YS24-SB10-5-6-0410	3/3	N/A	7.8E-05	N/A	N/A	N/A	N/A	NO	NUT

Table 2.8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: Air

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
	7440-62-2	Vanadium	6.5E-06	8.0E-06	$\mu g/m^3$	YS24-SB10-5-6-0410	3/3	N/A	8.0E-06	N/A	1.0E-02 N	N/A	N/A	NO	BSL
	7440-66-6	Zinc	8.4E-06	1.9E-05	$\mu g/m^3$	YS24-SS10-0410	3/3	N/A	1.9E-05	N/A	N/A	N/A	N/A	NO	NTX

* Surface soil & subsurface soil combined

[1] Minimum/Maximum calculated air concentrations from soil concentrations. Air concentrations calculated as Cair = Csoil*1000*(1/PEF+1/VF)
VF calculated for volatile and semi-volatile analytes identified as volatile in the Regional Screening Levels for Chemical Contaminants at Superfund Sites (Oak Ridge National Laboratory, June 2011). VF calculated on Table 2 Supplement. PEF = 1.36×10^9 m^3/kg.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Air.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10).
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for Chromium(VI) used as surrogate for chromium.
RSL value for Manganese (non-diet) used as surrogate for manganese.

[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
J = Estimated Value
K = Biased High
C* = C screening value used as screening level
N = Noncarcinogenic
$\mu g/m^3$ = micrograms per cubic meter
N/A = Not applicable
C = Carcinogenic
N/A = Not applicable

Table 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil* in Waste Area	106-46-7	1,4-Dichlorobenzene	5.7E-02 J	5.7E-02 J	MG/KG	A06TP03-02	1/22	0.0025 - 0.54	5.7E-02	N/A	2.4E+00 C	4.1E-04	SSL	NO	BSL
	78-93-3	2-Butanone	4.0E-03 J	1.5E-02	MG/KG	YS24-SS14-0410	4/20	0.004 - 0.031	1.5E-02	N/A	2.8E+03 N	1.5E+00	SSL	NO	BSL
	67-64-1	Acetone	4.6E-02	9.0E-02	MG/KG	A06TP02-01	2/22	0.0062 - 0.09	9.0E-02	N/A	6.1E+03 N	4.5E+00	SSL	NO	BSL
	71-43-2	Benzene	5.1E-04 K	5.1E-04 K	MG/KG	YS24-SB14-10-11-0410	1/22	0.0025 - 0.014	5.1E-04	N/A	1.1E+00 C*	2.1E-04	SSL	NO	BSL
	75-15-0	Carbon disulfide	6.5E-04 K	6.5E-04 K	MG/KG	YS24-SB14-10-11-0410	1/22	0.0025 - 0.014	6.5E-04	N/A	8.2E+01 N	3.1E-01	SSL	NO	BSL
	56-23-5	Carbon tetrachloride	2.0E-03 J	2.0E-03 J	MG/KG	A06TP01-01	1/22	0.002 - 0.014	2.0E-03	N/A	6.1E-01 C	1.7E-04	SSL	NO	BSL
	74-87-3	Chloromethane	5.7E-04 J	8.9E-03 K	MG/KG	YS24-SB20B-7-8-0410	2/22	0.0025 - 0.014	8.9E-03	N/A	1.2E+01 N	4.9E-02	SSL	NO	BSL
	100-41-4	Ethylbenzene	7.5E-04 K	7.5E-04 K	MG/KG	YS24-SB14-10-11-0410	1/22	0.0025 - 0.014	7.5E-04	N/A	5.4E+00 C	1.7E-03	SSL	NO	BSL
	98-82-8	Isopropylbenzene	4.8E-03 K	4.8E-03 K	MG/KG	YS24-SB14-10-11-0410	1/8	0.0025 - 0.012	4.8E-03	N/A	2.1E+02 N	1.1E+00	SSL	NO	BSL
	79-20-9	Methyl acetate	2.8E-03 J	8.2E-03	MG/KG	YS24-SS14-0410	4/8	0.0025 - 0.012	8.2E-03	N/A	7.8E+03 N	7.5E+00	SSL	NO	BSL
	75-09-2	Methylene chloride	9.0E-03 J	1.3E-02	MG/KG	A06TP03-01	2/22	0.002 - 0.013	1.3E-02	N/A	1.1E+01 C	1.2E-03	SSL	NO	BSL
	95-47-6	o-Xylene	4.5E-03 K	4.5E-03 K	MG/KG	YS24-SB14-10-11-0410	1/8	0.0025 - 0.012	4.5E-03	N/A	6.9E+01 N	2.0E-01	SSL	NO	BSL
	100-42-5	Styrene	1.7E-02 K	1.7E-02 K	MG/KG	YS24-SB14-10-11-0410	1/22	0.0025 - 0.014	1.7E-02	N/A	6.3E+02 N	1.8E+00	SSL	NO	BSL
	127-18-4	Tetrachloroethene	2.0E-03 J	2.0E-03 J	MG/KG	A06TP04-02 : A06TP06-01	2/22	0.002 - 0.014	2.0E-03	N/A	5.5E-01 C	4.9E-05	SSL	NO	BSL
	1330-20-7	Xylene, total	1.0E-03 J	5.0E-03 K	MG/KG	YS24-SB14-10-11-0410	2/22	0.001 - 0.014	5.0E-03	N/A	6.3E+01 N	2.0E-01	SSL	NO	BSL
	121-14-2	**2,4-Dinitrotoluene**	**2.1E+00 J**	**2.1E+00 J**	**MG/KG**	**A06TP05-02**	**1/22**	**0.26 - 2.1**	**2.1E+00**	**N/A**	**1.6E+00 C***	**2.9E-04**	**SSL**	**YES**	**ASL**
	606-20-2	2,6-Dinitrotoluene	2.8E-01 J	2.8E-01 J	MG/KG	A06TP05-02	1/22	0.25 - 3	2.8E-01	N/A	1.6E+00 C*	2.9E-04	SSL	NO	BSL
	91-58-7	2-Chloronaphthalene	7.1E-02 J	7.1E-02 J	MG/KG	A06TP02-02	1/22	0.071 - 0.54	7.1E-02	N/A	1.8E+02 N	1.5E+01	SSL	NO	BSL
	100-52-7	Benzaldehyde	5.0E-02 J	5.0E-02 J	MG/KG	YS24-SB14-10-11-0410	1/8	0.19 - 0.34	5.0E-02	N/A	7.8E+02 N	8.1E-01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**4.2E-02 J**	**4.2E-02 J**	**MG/KG**	**A06TP06-01**	**1/22**	**0.042 - 0.54**	**4.2E-02**	**N/A**	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**CPAH**
	50-32-8	**Benzo(a)pyrene**	**4.0E-02 J**	**4.0E-02 J**	**MG/KG**	**A06SS06-00**	**1/22**	**0.04 - 0.54**	**4.0E-02**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**3.8E-02 J**	**5.6E-02 J**	**MG/KG**	**A06TP06-01**	**2/22**	**0.056 - 0.54**	**5.6E-02**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**CPAH**
	191-24-2	Benzo(g,h,i)perylene	1.0E-01 J	1.7E-01 J	MG/KG	A06SS06-00	2/22	0.1 - 0.54	1.7E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**2.9E-02 J**	**4.6E-02 J**	**MG/KG**	**A06TP06-01**	**2/22**	**0.046 - 0.54**	**4.6E-02**	**N/A**	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**CPAH**
	117-81-7	bis(2-Ethylhexyl)phthalate	4.8E-02 J	2.0E+00	MG/KG	A06TP03-02	11/22	0.048 - 2	2.0E+00	N/A	3.5E+01 C*	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	6.9E-02 J	6.9E-02 J	MG/KG	YS24-SS20-0410	1/22	0.19 - 0.54	6.9E-02	N/A	2.6E+02 C*	5.1E-01	SSL	NO	BSL
	218-01-9	**Chrysene**	**5.0E-02 J**	**5.0E-02 J**	**MG/KG**	**A06TP06-01**	**1/22**	**0.05 - 0.54**	**5.0E-02**	**N/A**	**1.5E+01 C**	**1.1E+00**	**SSL**	**YES**	**CPAH**
	84-74-2	Di-n-butylphthalate	4.2E-02 J	6.8E-01	MG/KG	A06SS06-00	12/22	0.042 - 0.68	6.8E-01	N/A	6.1E+02 N	9.2E+00	SSL	NO	BSL
	206-44-0	Fluoranthene	8.8E-02 J	8.8E-02 J	MG/KG	A06TP06-01	1/22	0.088 - 0.54	8.8E-02	N/A	2.3E+02 N	1.6E+02	SSL	NO	BSL
	621-64-7	**n-Nitroso-di-n-propylamine**	**9.3E-02 J**	**9.3E-02 J**	**MG/KG**	**A06TP03-02**	**1/22**	**0.093 - 0.54**	**9.3E-02**	**N/A**	**6.9E-02 C**	**7.2E-06**	**SSL**	**YES**	**ASL**
	86-30-6	n-Nitrosodiphenylamine	9.3E-02 J	9.3E-02 J	MG/KG	A06TP03-02	1/22	0.093 - 0.54	9.3E-02	N/A	9.9E+01 C	7.5E-02	SSL	NO	BSL
	129-00-0	Pyrene	2.5E-02 J	6.8E-02 J	MG/KG	A06TP06-01	3/22	0.057 - 0.54	6.8E-02	N/A	1.7E+02 N	1.2E+02	SSL	NO	BSL
	72-54-8	4,4'-DDD	1.5E-03 J	2.0E-03 J	MG/KG	YS24-SB20-7-8-0410	2/22	0.0037 - 0.17	2.0E-03	N/A	2.0E+00 C	6.6E-02	SSL	NO	BSL

Table 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil* in Waste Area (cont'd)	72-55-9	4,4'-DDE	1.7E-03 J	3.8E-03 L	MG/KG	YS24-SB20B-7-8-0410	3/22	0.0037 - 0.17	3.8E-03	N/A	1.4E+00 C	4.7E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	4.9E-03	1.4E-02 J	MG/KG	YS24-SB20B-7-8-0410	3/22	0.0037 - 0.17	1.4E-02	N/A	1.7E+00 C*	6.7E-02	SSL	NO	BSL
	309-00-2	Aldrin	7.7E-03 J	7.7E-03 J	MG/KG	YS24-SB14-10-11-0410	1/22	0.0019 - 0.087	7.7E-03	N/A	2.9E-02 C*	6.5E-04	SSL	NO	BSL
	319-84-6	**alpha-BHC**	**2.9E-04 J**	**4.6E-01**	**MG/KG**	**YS24-SB14-10-11-0410**	**2/22**	**0.0019 - 0.11**	**4.6E-01**	**N/A**	**7.7E-02 C**	**6.2E-05**	**SSL**	**YES**	**ASL**
	5103-71-9	alpha-Chlordane	2.3E-04 J	1.2E+00 J	MG/KG	A06TP03-02	6/22	0.0019 - 1.2	1.2E+00	N/A	1.6E+00 C*	N/A		NO	BSL
	11097-69-1	**Aroclor-1254**	**5.9E-01**	**7.9E+01**	**MG/KG**	**A06TP03-02**	**5/22**	**0.019 - 79**	**7.9E+01**	**N/A**	**1.1E-01 C****	**8.8E-03**	**SSL**	**YES**	**ASL**
	11096-82-5	**Aroclor-1260**	**6.1E-02 J**	**4.9E+00**	**MG/KG**	**A06TP02-02**	**5/22**	**0.019 - 4.9**	**4.9E+00**	**N/A**	**2.2E-01 C**	**2.4E-02**	**SSL**	**YES**	**ASL**
	319-85-7	beta-BHC	5.2E-04 J	2.9E-03 J	MG/KG	YS24-SS15-0410	4/22	0.00096 - 0.087	2.9E-03	N/A	2.7E-01 C	2.2E-04	SSL	NO	BSL
	319-86-8	delta-BHC	8.4E-04 J	2.6E-02	MG/KG	YS24-SB14-10-11-0410	2/22	0.00084 - 0.087	2.6E-02	N/A	2.7E-01 C	N/A		NO	BSL
	60-57-1	**Dieldrin**	**5.8E-03 L**	**9.0E-02 J**	**MG/KG**	**A06TP02-02**	**3/22**	**0.0037 - 0.17**	**9.0E-02**	**N/A**	**3.0E-02 C**	**1.7E-04**	**SSL**	**YES**	**ASL**
	33213-65-9	Endosulfan II	1.5E-03 J	1.5E-03 J	MG/KG	YS24-SB20B-7-8-0410	1/22	0.0037 - 0.17	1.5E-03	N/A	3.7E+01 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	3.6E-03 L	3.6E-03 L	MG/KG	A06TP06-01	1/22	0.0036 - 0.17	3.6E-03	N/A	3.7E+01 N	N/A		NO	BSL
	72-20-8	Endrin	4.1E-04 J	2.9E-02	MG/KG	A06TP03-01	3/22	0.0037 - 0.17	2.9E-02	N/A	1.8E+00 N	4.4E-01	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	8.5E-04 J	8.5E-04 J	MG/KG	YS24-SB20B-7-8-0410	1/22	0.0037 - 0.17	8.5E-04	N/A	1.8E+00 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	5.2E-04 J	5.2E-04 J	MG/KG	YS24-SS20-0410	1/22	0.0019 - 0.087	5.2E-04	N/A	5.2E-01 C*	3.6E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	3.7E-04 J	3.7E-02 J	MG/KG	A06TP02-02	5/22	0.0019 - 0.087	3.7E-02	N/A	1.6E+00 C*	N/A		NO	BSL
	76-44-8	**Heptachlor**	**2.0E-04 J**	**2.0E-01**	**MG/KG**	**YS24-SB14-10-11-0410**	**2/21**	**0.0019 - 0.11**	**2.0E-01**	**N/A**	**1.1E-01 C**	**1.2E-03**	**SSL**	**YES**	**ASL**
	1024-57-3	Heptachlor epoxide	8.8E-04 J	8.8E-04 J	MG/KG	YS24-SB20B-7-8-0410	1/22	0.0019 - 0.087	8.8E-04	N/A	5.3E-02 C*	1.5E-04	SSL	NO	BSL
	72-43-5	Methoxychlor	5.3E-03 J	5.3E-03 J	MG/KG	YS24-SB14-10-11-0410	1/22	0.019 - 0.87	5.3E-03	N/A	3.1E+01 N	9.9E+00	SSL	NO	BSL
	99-35-4	1,3,5-Trinitrobenzene	4.5E-01 J	4.5E-01 J	MG/KG	A06TP05-02	1/22	0.25 - 1.5	4.5E-01	N/A	2.2E+02 N	3.9E+00	SSL	NO	BSL
	118-96-7	**2,4,6-Trinitrotoluene**	**4.1E+00 J**	**4.1E+00 J**	**MG/KG**	**A06TP05-02**	**1/22**	**0.25 - 4.1**	**4.1E+00**	**N/A**	**3.6E+00 C****	**1.3E-02**	**SSL**	**YES**	**ASL**
	7429-90-5	**Aluminum**	**3.3E+03**	**3.4E+05**	**MG/KG**	**YS24-SB20B-7-8-0410**	**22/22**	**21.9 - 11600**	**3.4E+05**	**1.2E+04**	**7.7E+03 N**	**5.5E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	3.6E-01 J	1.0E+00 J	MG/KG	YS24-SB121-0410-SO	6/14	1.1 - 3.1	1.0E+00	1.1E+01	3.1E+00 N	6.6E-01	SSL	NO	BSL
	7440-38-2	**Arsenic**	**7.9E-01 K**	**5.6E+00**	**MG/KG**	**A06TP02-02 : A06TP03-01**	**17/22**	**0.79 - 5.6**	**5.6E+00**	**6.4E+00**	**3.9E-01 C***	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.6E+01	3.3E+02	MG/KG	A06TP03-02	22/22	15.7 - 327	3.3E+02	5.3E+01	1.5E+03 N	3.0E+02	SSL	NO	BSL
	7440-41-7	Beryllium	1.6E-01	4.0E-01 J	MG/KG	YS24-SS14-0410	13/22	0.16 - 0.96	4.0E-01	5.9E-01	1.6E+01 N	5.8E+01	SSL	NO	BSL
	7440-43-9	**Cadmium**	**1.3E-01 J**	**7.9E+02**	**MG/KG**	**A06TP03-01**	**14/22**	**0.32 - 786**	**7.9E+02**	**1.5E+00**	**7.0E+00 N**	**1.4E+00**	**SSL**	**YES**	**ASL**
	7440-70-2	Calcium	2.2E+02 J	2.0E+05	MG/KG	A06TP02-02	22/22	432 - 196000	2.0E+05	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**4.3E+00 L**	**6.5E+01**	**MG/KG**	**YS24-SB20B-7-8-0410**	**22/22**	**1.1 - 28.3**	**6.5E+01**	**1.8E+01**	**2.9E-01 C**	**8.3E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**6.2E-01**	**1.1E+01**	**MG/KG**	**YS24-SB121-0410-SO**	**21/22**	**0.55 - 7.9**	**1.1E+01**	**9.9E+00**	**2.3E+00 N**	**4.9E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	**Copper**	**7.2E-01**	**1.6E+04**	**MG/KG**	**YS24-SB20B-7-8-0410**	**22/22**	**0.55 - 181**	**1.6E+04**	**4.3E+00**	**3.1E+02 N**	**5.1E+01**	**SSL**	**YES**	**ASL**
	7439-89-6	**Iron**	**2.5E+03 J**	**2.1E+04**	**MG/KG**	**YS24-SB121-0410-SO**	**22/22**	**10.9 - 16500**	**2.1E+04**	**2.0E+04**	**5.5E+03 N**	**6.4E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	3.1E+00	3.4E+02	MG/KG	A06TP03-01	22/22	0.33 - 344	3.4E+02	1.7E+01	4.0E+02 N	N/A		NO	BSL
	7439-95-4	Magnesium	1.3E+02	5.1E+03	MG/KG	YS24-SB121-0410-SO	22/22	128 - 2020	5.1E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**8.8E+00 J**	**2.9E+03**	**MG/KG**	**YS24-SB20B-7-8-0410**	**22/22**	**1.1 - 171**	**2.9E+03**	**3.2E+02**	**1.8E+02 N**	**N/A**		**YES**	**ASL**
	7439-97-6	Mercury	2.3E-02 J	1.3E+00	MG/KG	A06TP03-01	6/22	0.037 - 1.3	1.3E+00	1.1E-01	2.3E+00 N	3.3E-02	SSL	NO	BSL

Table 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil* in	7440-02-0	Nickel	1.2E+00	6.2E+01	MG/KG	A06TP03-02	22/22	0.55 - 62	6.2E+01	9.5E+00	1.5E+02 N	4.8E+01	SSL	NO	BSL
Waste Area	7440-09-7	Potassium	1.5E+02 J	2.4E+03	MG/KG	YS24-SB15-7-8-0410	21/22	159 - 1170	2.4E+03	7.1E+02	N/A	N/A		NO	NUT
(cont'd)	7782-49-2	Selenium	6.2E-01 K	6.2E-01 K	MG/KG	A06SS08D-00	1/22	0.55 - 0.96	6.2E-01	5.1E-01	3.9E+01 N	9.5E-01	SSL	NO	BSL
	7440-22-4	Silver	5.9E-01	8.8E+00	MG/KG	A06TP03-01	5/22	0.43 - 8.8	8.8E+00	2.1E+00	3.9E+01 N	1.6E+00	SSL	NO	BSL
	7440-23-5	Sodium	2.0E+01	1.2E+03	MG/KG	A06TP02-02	22/22	19.6 - 1170	1.2E+03	5.2E+02	N/A	N/A		NO	NUT
	7440-62-2	**Vanadium**	**6.5E+00**	**8.9E+01**	**MG/KG**	**YS24-SB121-0410-SO**	**22/22**	**2.2 - 18.9**	**8.9E+01**	**2.8E+01**	**3.9E+01 N**	**N/A**	**SSL**	**YES**	**ASL**
	7440-66-6	Zinc	6.0E+00 J	1.6E+03	MG/KG	A06TP03-02	22/22	2.2 - 1580	1.6E+03	2.7E+01	2.3E+03 N	6.8E+02	SSL	NO	BSL

* Surface soil & subsurface soil combined

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values from Cheatham Annex/Yorktown background surface and subsurface soil samples; values represent the > 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
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 technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) 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 Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)

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
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
SSL = Soil Screening Level for Protection of Groundwater, from RSL Table
S = Concentration exceeds Csat, used Csat as screening value
MG/KG = milligrams per kilogram
N/A = Not applicable

Table 2.10
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

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
Emissions from Soil* in Waste Area (cont'd)	106-46-7	1,4-Dichlorobenzene	3.8E-03 J	3.8E-03 J	µg/m^3	A06TP03-02	1/22	N/A	3.8E-03	N/A	2.2E-01 C	N/A	N/A	NO	BSL
	78-93-3	2-Butanone	2.3E-04 J	8.6E-04	µg/m^3	YS24-SS14-0410	4/20	N/A	8.6E-04	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	67-64-1	Acetone	2.4E-03	4.6E-03	µg/m^3	A06TP02-01	2/22	N/A	4.6E-03	N/A	3.2E+03 N	N/A	N/A	NO	BSL
	71-43-2	Benzene	1.0E-04 K	1.0E-04 K	µg/m^3	YS24-SB14-10-11-0410	1/22	N/A	1.0E-04	N/A	3.1E-01 C	N/A	N/A	NO	BSL
	75-15-0	Carbon disulfide	3.9E-04 K	3.9E-04 K	µg/m^3	YS24-SB14-10-11-0410	1/22	N/A	3.9E-04	N/A	7.3E+02 N	N/A	N/A	NO	BSL
	56-23-5	Carbon tetrachloride	9.4E-04 J	9.4E-04 J	µg/m^3	A06TP01-01	1/22	N/A	9.4E-04	N/A	4.1E-01 C	N/A	N/A	NO	BSL
	74-87-3	Chloromethane	3.4E-04 J	5.3E-03 K	µg/m^3	YS24-SB20B-7-8-0410	2/22	N/A	5.3E-03	N/A	9.4E+00 N	N/A	N/A	NO	BSL
	100-41-4	Ethylbenzene	9.3E-05 K	9.3E-05 K	µg/m^3	YS24-SB14-10-11-0410	1/22	N/A	9.3E-05	N/A	9.7E-01 C	N/A	N/A	NO	BSL
	98-82-8	Isopropylbenzene	5.4E-04 K	5.4E-04 K	µg/m^3	YS24-SB14-10-11-0410	1/8	N/A	5.4E-04	N/A	4.2E+01 N	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	2.4E-04 J	7.1E-04	µg/m^3	YS24-SS14-0410	4/8	N/A	7.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	75-09-2	Methylene chloride	2.9E-03 J	4.2E-03	µg/m^3	A06TP03-01	2/22	N/A	4.2E-03	N/A	5.2E+00 C	N/A	N/A	NO	BSL
	95-47-6	o-Xylene	4.9E-04 K	4.9E-04 K	µg/m^3	YS24-SB14-10-11-0410	1/8	N/A	4.9E-04	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	100-42-5	Styrene	1.3E-03 K	1.3E-03 K	µg/m^3	YS24-SB14-10-11-0410	1/22	N/A	1.3E-03	N/A	1.0E+03 N	N/A	N/A	NO	BSL
	127-18-4	Tetrachloroethene	6.0E-04 J	6.0E-04 J	µg/m^3	A06TP04-02 : A06TP06-01	2/22	N/A	6.0E-04	N/A	4.1E-01 C	N/A	N/A	NO	BSL
	1330-20-7	Xylene, total	1.2E-04 J	6.0E-04 J	µg/m^3	YS24-SB14-10-11-0410	2/22	N/A	6.0E-04	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	121-14-2	2,4-Dinitrotoluene	1.5E-06	1.5E-06	µg/m^3	A06TP05-02	1/22	N/A	1.5E-06	N/A	2.7E-02 C	N/A	N/A	NO	BSL
	606-20-2	2,6-Dinitrotoluene	2.1E-07 J	2.1E-07 J	µg/m^3	A06TP05-02	1/22	N/A	2.1E-07	N/A	N/A	N/A	N/A	NO	NTX
	91-58-7	2-Chloronaphthalene	6.2E-04 J	6.2E-04 J	µg/m^3	A06TP02-02	1/22	N/A	6.2E-04	N/A	N/A	N/A	N/A	NO	NTX
	100-52-7	Benzaldehyde	1.6E-03 J	1.6E-03 J	µg/m^3	YS24-SB14-10-11-0410	1/8	N/A	1.6E-03	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	3.1E-08 J	3.1E-08 J	µg/m^3	A06TP06-01	1/22	N/A	3.1E-08	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	2.9E-08 J	2.9E-08 J	µg/m^3	A06SS06-00	1/22	N/A	2.9E-08	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	2.8E-08 J	4.1E-08 J	µg/m^3	A06TP06-01	2/22	N/A	4.1E-08	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	7.4E-08 J	1.3E-07 J	µg/m^3	A06SS06-00	2/22	N/A	1.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	2.1E-08 J	3.4E-08 J	µg/m^3	A06TP06-01	2/22	N/A	3.4E-08	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.5E-08 J	1.5E-06	µg/m^3	A06TP03-02	11/22	N/A	1.5E-06	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	5.1E-08 J	5.1E-08 J	µg/m^3	YS24-SS20-0410	1/22	N/A	5.1E-08	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	3.7E-08 J	3.7E-08 J	µg/m^3	A06TP06-01	1/22	N/A	3.7E-08	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	84-74-2	Di-n-butylphthalate	3.1E-08 J	5.0E-07	µg/m^3	A06SS06-00	12/22	N/A	5.0E-07	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	6.5E-08 J	6.5E-08 J	µg/m^3	A06TP06-01	1/22	N/A	6.5E-08	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	621-64-7	n-Nitroso-di-n-propylamine	6.8E-08 J	6.8E-08 J	µg/m^3	A06TP03-02	1/22	N/A	6.8E-08	N/A	1.2E-03 C	N/A	N/A	NO	BSL
	86-30-6	n-Nitrosodiphenylamine	6.8E-08 J	6.8E-08 J	µg/m^3	A06TP03-02	1/22	N/A	6.8E-08	N/A	9.4E-01 C	N/A	N/A	NO	BSL
	129-00-0	Pyrene	7.4E-06 J	2.0E-05 J	µg/m^3	A06TP06-01	3/22	N/A	2.0E-05	N/A	N/A	N/A	N/A	NO	NTX
	72-54-8	4,4'-DDD	1.1E-09 J	1.5E-09 J	µg/m^3	YS24-SB20-7-8-0410	2/22	N/A	1.5E-09	N/A	3.5E-02 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	1.3E-09 J	2.8E-09 L	µg/m^3	YS24-SB20B-7-8-0410	3/22	N/A	2.8E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	3.6E-09	1.0E-08 J	µg/m^3	YS24-SB20B-7-8-0410	3/22	N/A	1.0E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	309-00-2	Aldrin	5.7E-09 J	5.7E-09 J	µg/m^3	YS24-SB14-10-11-0410	1/22	N/A	5.7E-09	N/A	5.0E-04 C	N/A	N/A	NO	BSL
	319-84-6	alpha-BHC	2.1E-10 J	3.4E-07	µg/m^3	YS24-SB14-10-11-0410	2/22	N/A	3.4E-07	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	1.7E-10 J	8.8E-07 J	µg/m^3	A06TP03-02	6/22	N/A	8.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	11097-69-1	Aroclor-1254	4.3E-07	5.8E-05	µg/m^3	A06TP03-02	5/22	N/A	5.8E-05	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	11096-82-5	Aroclor-1260	4.5E-08 J	3.6E-06	µg/m^3	A06TP02-02	5/22	N/A	3.6E-06	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	319-85-7	beta-BHC	3.8E-10 J	2.1E-09 J	µg/m^3	YS24-SS15-0410	4/22	N/A	2.1E-09	N/A	4.6E-03 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	6.2E-10 J	1.9E-08	µg/m^3	YS24-SB14-10-11-0410	2/22	N/A	1.9E-08	N/A	N/A	N/A	N/A	NO	NTX
	60-57-1	Dieldrin	4.3E-09 L	6.6E-08 J	µg/m^3	A06TP02-02	3/22	N/A	6.6E-08	N/A	5.3E-04 C	N/A	N/A	NO	BSL
	33213-65-9	Endosulfan II	1.1E-09 J	1.1E-09 J	µg/m^3	YS24-SB20B-7-8-0410	1/22	N/A	1.1E-09	N/A	N/A	N/A	N/A	NO	NTX
	1031-07-8	Endosulfan sulfate	2.6E-09 L	2.6E-09 L	µg/m^3	A06TP06-01	1/22	N/A	2.6E-09	N/A	N/A	N/A	N/A	NO	NTX
	72-20-8	Endrin	3.0E-10 J	2.1E-08	µg/m^3	A06TP03-01	3/22	N/A	2.1E-08	N/A	N/A	N/A	N/A	NO	NTX
	7421-93-4	Endrin aldehyde	6.3E-10 J	6.3E-10 J	µg/m^3	YS24-SB20B-7-8-0410	1/22	N/A	6.3E-10	N/A	N/A	N/A	N/A	NO	NTX

Table 2.10
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

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
Emissions from Soil* in Waste Area (cont'd)	58-89-9	gamma-BHC (Lindane)	3.8E-10 J	3.8E-10 J	µg/m^3	YS24-SS20-0410	1/22	N/A	3.8E-10	N/A	7.8E-03 C	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	2.7E-10 J	2.7E-08 J	µg/m^3	A06TP02-02	5/22	N/A	2.7E-08	N/A	N/A	N/A	N/A	NO	NTX
	76-44-8	Heptachlor	1.5E-10 J	1.5E-07	µg/m^3	YS24-SB14-10-11-0410	2/21	N/A	1.5E-07	N/A	1.9E-03 C	N/A	N/A	NO	BSL
	1024-57-3	Heptachlor epoxide	6.5E-10 J	6.5E-10 J	µg/m^3	YS24-SB20B-7-8-0410	1/22	N/A	6.5E-10	N/A	9.4E-04 C	N/A	N/A	NO	BSL
	72-43-5	Methoxychlor	3.9E-09 J	3.9E-09 J	µg/m^3	YS24-SB14-10-11-0410	1/22	N/A	3.9E-09	N/A	N/A	N/A	N/A	NO	NTX
	99-35-4	1,3,5-Trinitrobenzene	3.3E-07 J	3.3E-07 J	µg/m^3	A06TP05-02	1/22	N/A	3.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	118-96-7	2,4,6-Trinitrotoluene	3.0E-06 J	3.0E-06 J	µg/m^3	A06TP05-02	1/22	N/A	3.0E-06	N/A	N/A	N/A	N/A	NO	NTX
	7429-90-5	Aluminum	2.5E-03	2.5E-01	µg/m^3	YS24-SB20B-7-8-0410	22/22	N/A	2.5E-01	N/A	5.2E-01 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	2.6E-07 J	7.4E-07 J	µg/m^3	YS24-SB121-0410-SO	6/14	N/A	7.4E-07	N/A	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	5.8E-07 K	4.1E-06	µg/m^3	A06TP02-02 : A06TP03-01	17/22	N/A	4.1E-06	N/A	5.7E-04 C*	N/A	N/A	NO	BSL
	7440-39-3	Barium	1.2E-05	2.4E-04	µg/m^3	A06TP03-02	22/22	N/A	2.4E-04	N/A	5.2E-04 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	1.2E-07	2.9E-07 J	µg/m^3	YS24-SS14-0410	13/22	N/A	2.9E-07	N/A	1.0E-03 C*	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	9.6E-08 J	5.8E-04	µg/m^3	A06TP03-01	14/22	N/A	5.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	7440-70-2	Calcium	1.6E-04 J	1.4E-01	µg/m^3	A06TP02-02	22/22	N/A	1.4E-01	N/A	N/A	N/A	N/A	NO	NUT
	7440-47-3	**Chromium**	**3.2E-06 L**	**4.8E-05**	**µg/m^3**	**YS24-SB20B-7-8-0410**	**22/22**	**N/A**	**4.8E-05**	**N/A**	**1.1E-05 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	4.6E-07	7.9E-06	µg/m^3	YS24-SB121-0410-SO	21/22	N/A	7.9E-06	N/A	2.7E-04 C*	N/A	N/A	NO	BSL
	7440-50-8	Copper	5.3E-07	1.1E-02	µg/m^3	YS24-SB20B-7-8-0410	22/22	N/A	1.1E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	1.8E-03 J	1.6E-02	µg/m^3	YS24-SB121-0410-SO	22/22	N/A	1.6E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	2.3E-06	2.5E-04	µg/m^3	A06TP03-01	22/22	N/A	2.5E-04	N/A	N/A	N/A	N/A	NO	NTX
	7439-95-4	Magnesium	9.4E-05	3.7E-03	µg/m^3	YS24-SB121-0410-SO	22/22	N/A	3.7E-03	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	6.5E-06 J	2.1E-03	µg/m^3	YS24-SB20B-7-8-0410	22/22	N/A	2.1E-03	N/A	N/A	N/A	N/A	NO	NTX
	7439-97-6	Mercury	1.7E-08 J	9.6E-07	µg/m^3	A06TP03-01	6/22	N/A	9.6E-07	N/A	3.1E-04 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	8.8E-07	4.6E-05	µg/m^3	A06TP03-02	22/22	N/A	4.6E-05	N/A	9.4E-03 C*	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.1E-04 J	1.8E-03	µg/m^3	YS24-SB15-7-8-0410	21/22	N/A	1.8E-03	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	4.6E-07 K	4.6E-07 K	µg/m^3	A06SS08D-00	1/22	N/A	4.6E-07	N/A	2.1E-02 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	4.3E-07	6.5E-06	µg/m^3	A06TP03-01	5/22	N/A	6.5E-06	N/A	N/A	N/A	N/A	NO	NTX
	7440-23-5	Sodium	1.4E-05	8.6E-04	µg/m^3	A06TP02-02	22/22	N/A	8.6E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-62-2	Vanadium	4.8E-06	6.6E-05	µg/m^3	YS24-SB121-0410-SO	22/22	N/A	6.6E-05	N/A	N/A 0	N/A	N/A	NO	NTX
	7440-66-6	Zinc	4.4E-06 J	1.2E-03	µg/m^3	A06TP03-02	22/22	N/A	1.2E-03	N/A	N/A	N/A	N/A	NO	NTX

* Surface soil & subsurface soil combined

[1] Minimum/Maximum calculated air concentrations from soil concentrations. Air concentrations calculated as Cair = Csoil*1000*(1/PEF+1/VF)
VF calculated for volatile and semi-volatile analytes identified as volatile in the Regional Screening Levels for Chemical Contaminants at Superfund Sites (Oak Ridge National Laboratory, June 2011). VF calculated on Table 2 Supplement. PEF = 1.36 x 10^9 m^3/kg.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Air.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10).
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) used as surrogate for chromium.
RSL value for Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[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
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
N = Noncarcinogenic
µg/m^3 = micrograms per cubic meter
N/A = Not applicable

Table 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil*	120-82-1	1,2,4-Trichlorobenzene	3.3E-04 J	3.3E-04 J	MG/KG	YS24-SB18-7-8-0410	1/94	0.0015 - 0.54	3.3E-04	N/A	6.2E+00 C**	6.8E-03	SSL	NO	BSL
Across Site	106-46-7	1,4-Dichlorobenzene	5.2E-02 J	5.7E-02 J	MG/KG	A06TP03-02	2/94	0.0015 - 0.54	5.7E-02	N/A	2.4E+00 C	4.1E-04	SSL	NO	BSL
	78-93-3	2-Butanone	4.0E-03 J	8.8E-02	MG/KG	A06SB03-01D	22/87	0.0037 - 0.088	8.8E-02	N/A	2.8E+03 N	1.5E+00	SSL	NO	BSL
	67-64-1	Acetone	3.0E-03 J	9.0E-02	MG/KG	A06TP02-01	5/94	0.003 - 0.09	9.0E-02	N/A	6.1E+03 N	4.5E+00	SSL	NO	BSL
	71-43-2	Benzene	2.0E-04 K	5.1E-04 K	MG/KG	YS24-SB14-10-11-0410	3/94	0.0015 - 0.014	5.1E-04	N/A	1.1E+00 C*	2.1E-04	SSL	NO	BSL
	75-15-0	Carbon disulfide	6.5E-04 K	3.8E-03 K	MG/KG	YS24-SS06-0410	7/94	0.0015 - 0.014	3.8E-03	N/A	8.2E+01 N	3.1E-01	SSL	NO	BSL
	56-23-5	Carbon tetrachloride	2.0E-03 J	2.0E-03 J	MG/KG	A06TP01-01	1/94	0.0015 - 0.014	2.0E-03	N/A	6.1E-01 C	1.7E-04	SSL	NO	BSL
	108-90-7	Chlorobenzene	1.0E-03 J	1.0E-03 J	MG/KG	A06SS16-00	1/94	0.001 - 0.014	1.0E-03	N/A	2.9E+01 N	6.2E-02	SSL	NO	BSL
	74-87-3	Chloromethane	5.7E-04 J	8.9E-03 K	MG/KG	YS24-SB20B-7-8-0410	3/94	0.0015 - 0.014	8.9E-03	N/A	1.2E+01 N	4.9E-02	SSL	NO	BSL
	100-41-4	Ethylbenzene	7.5E-04 K	5.0E-03	MG/KG	YS24-SS08-0410	6/94	0.0015 - 0.014	5.0E-03	N/A	5.4E+00 C	1.7E-03	SSL	NO	BSL
	98-82-8	Isopropylbenzene	4.8E-03 K	4.8E-03 K	MG/KG	YS24-SB14-10-11-0410	1/50	0.0015 - 0.012	4.8E-03	N/A	2.1E+02 N	1.1E+00	SSL	NO	BSL
	79-20-9	Methyl acetate	2.8E-03 J	2.1E+00 J	MG/KG	YS24-SS03-0410	28/50	0.0015 - 0.2	2.1E+00	N/A	7.8E+03 N	7.5E+00	SSL	NO	BSL
	75-09-2	Methylene chloride	3.0E-03 J	4.0E-02	MG/KG	A06SB05-05D	8/94	0.0015 - 0.04	4.0E-02	N/A	1.1E+01 C	1.2E-03	SSL	NO	BSL
	95-47-6	o-Xylene	4.5E-03 K	4.5E-03 K	MG/KG	YS24-SB14-10-11-0410	1/50	0.0015 - 0.012	4.5E-03	N/A	6.9E+01 N	2.0E-01	SSL	NO	BSL
	100-42-5	Styrene	4.0E-05 J	1.7E-02 K	MG/KG	YS24-SB14-10-11-0410	2/94	0.0015 - 0.014	1.7E-02	N/A	6.3E+02 N	1.8E+00	SSL	NO	BSL
	127-18-4	Tetrachloroethene	2.0E-03 J	2.0E-03 J	MG/KG	A06TP04-02 : A06TP06-01	2/94	0.0015 - 0.014	2.0E-03	N/A	5.5E-01 C	4.9E-05	SSL	NO	BSL
	108-88-3	Toluene	8.0E-04 J	6.0E-03 J	MG/KG	24SS04	5/94	0.0008 - 0.014	6.0E-03	N/A	5.0E+02 N	1.6E+00	SSL	NO	BSL
	1330-20-7	Xylene, total	1.0E-03 J	5.0E-03 K	MG/KG	YS24-SB14-10-11-0410	3/94	0.001 - 0.014	5.0E-03	N/A	6.3E+01 N	2.0E-01	SSL	NO	BSL
	121-14-2	**2,4-Dinitrotoluene**	**9.7E-02 J**	**2.1E+00 J**	**MG/KG**	**A06TP05-02**	**5/94**	**0.00026 - 2.1**	**2.1E+00**	**N/A**	**1.6E+00 C***	**2.9E-04**	**SSL**	**YES**	**ASL**
	606-20-2	2,6-Dinitrotoluene	2.8E-01 J	7.3E-01	MG/KG	A06SB05-05	3/94	0.00025 - 3	7.3E-01	N/A	6.1E+00 N	5.0E-02	SSL	NO	BSL
	91-58-7	2-Chloronaphthalene	6.6E-02 J	7.1E-02 J	MG/KG	A06TP02-02	2/94	0.071 - 0.54	7.1E-02	N/A	1.8E+02 N	1.5E+01	SSL	NO	BSL
	106-47-8	4-Chloroaniline	1.8E-01 J	1.8E-01 J	MG/KG	A06SS11-00	1/94	0.18 - 0.66	1.8E-01	N/A	2.4E+00 C	1.4E-04	SSL	NO	BSL
	208-96-8	Acenaphthylene	2.6E-02 J	2.6E-02 J	MG/KG	YS24-SS31-0410	1/94	0.18 - 0.54	2.6E-02	N/A	3.4E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	3.5E-02 J	3.5E-02 J	MG/KG	YS24-SS31-0410	1/94	0.18 - 0.54	3.5E-02	N/A	1.7E+03 N	3.6E+02	SSL	NO	BSL
	100-52-7	Benzaldehyde	2.9E-02 J	5.0E-02 J	MG/KG	YS24-SB14-10-11-0410	2/50	0.094 - 0.34	5.0E-02	N/A	7.8E+02 N	8.1E-01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**3.2E-02 J**	**1.6E-01 J**	**MG/KG**	**YS24-SS31-0410**	**13/94**	**0.04 - 0.54**	**1.6E-01**	**N/A**	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**2.2E-02 J**	**1.8E-01 J**	**MG/KG**	**YS24-SB04-0_5-2-0410 : YS24-SS31-0410**	**14/94**	**0.04 - 0.54**	**1.8E-01**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**2.3E-02 K**	**3.0E-01**	**MG/KG**	**YS24-SB04-0_5-2-0410**	**16/94**	**0.046 - 0.54**	**3.0E-01**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.2E-02 J	8.7E-01 J	MG/KG	A06SS09-00	13/94	0.1 - 0.87	8.7E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**2.9E-02 J**	**3.0E-01**	**MG/KG**	**YS24-SS31-0410**	**15/94**	**0.046 - 0.54**	**3.0E-01**	**N/A**	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**CPAH**
	117-81-7	bis(2-Ethylhexyl)phthalate	4.1E-02 J	3.6E+00	MG/KG	A06SS11-00	38/94	0.045 - 3.6	3.6E+00	N/A	3.5E+01 C*	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	4.4E-02 J	1.2E+00	MG/KG	A06SB06-04	5/94	0.18 - 1.2	1.2E+00	N/A	2.6E+02 C*	5.1E-01	SSL	NO	BSL
	218-01-9	**Chrysene**	**3.3E-02 J**	**2.6E-01**	**MG/KG**	**YS24-SS31-0410**	**14/94**	**0.05 - 0.54**	**2.6E-01**	**N/A**	**1.5E+01 C**	**1.1E+00**	**SSL**	**YES**	**CPAH**
	53-70-3	**Dibenz(a,h)anthracene**	**4.5E-02 J**	**4.5E-02 J**	**MG/KG**	**YS24-SB04-0_5-2-0410 : YS24-SS31-0410**	**2/94**	**0.18 - 0.54**	**4.5E-02**	**N/A**	**1.5E-02 C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	84-74-2	Di-n-butylphthalate	2.5E-02 J	4.6E+00	MG/KG	A06SS12-00D	38/94	0.042 - 4.6	4.6E+00	N/A	6.1E+02 N	9.2E+00	SSL	NO	BSL
	117-84-0	Di-n-octylphthalate	9.8E-02 J	4.5E-01	MG/KG	YS24-SS01P-0410	2/94	0.098 - 0.54	4.5E-01	N/A	6.1E+02 N	N/A		NO	BSL
	206-44-0	Fluoranthene	2.3E-02 J	2.5E-01	MG/KG	YS24-SS31-0410	21/94	0.088 - 0.54	2.5E-01	N/A	2.3E+02 N	1.6E+02	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**6.3E-02 J**	**1.5E-01 J**	**MG/KG**	**YS24-SB04-0_5-2-0410 : YS24-SS31-0410**	**3/94**	**0.063 - 0.54**	**1.5E-01**	**N/A**	**1.5E-01 C**	**1.2E-01**	**SSL**	**YES**	**ASL**
	621-64-7	**n-Nitroso-di-n-propylamine**	**9.3E-02 J**	**9.3E-02 J**	**MG/KG**	**A06TP03-02**	**1/94**	**0.093 - 0.54**	**9.3E-02**	**N/A**	**6.9E-02 C**	**7.2E-06**	**SSL**	**YES**	**ASL**
	86-30-6	n-Nitrosodiphenylamine	9.3E-02 J	9.3E-02 J	MG/KG	A06TP03-02	1/94	0.093 - 0.54	9.3E-02	N/A	9.9E+01 C	7.5E-02	SSL	NO	BSL
	85-01-8	Phenanthrene	2.5E-02 J	8.8E-02 J	MG/KG	YS24-SS08-0410	16/94	0.064 - 0.54	8.8E-02	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	2.5E-02 J	3.3E-01	MG/KG	YS24-SS31-0410	22/94	0.057 - 0.54	3.3E-01	N/A	1.7E+02 N	1.2E+02	SSL	NO	BSL
	72-54-8	4,4'-DDD	4.2E-04 L	3.5E-02	MG/KG	A06SS11-00	8/94	0.00054 - 0.17	3.5E-02	N/A	2.0E+00 C	6.6E-02	SSL	NO	BSL

Table 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil*	72-55-9	4,4'-DDE	2.6E-04 J	1.1E-02 J	MG/KG	A06SS11-00	19/94	0.00026 - 0.17	1.1E-02	N/A	1.4E+00 C	4.7E-02	SSL	NO	BSL
Across Site	50-29-3	4,4'-DDT	5.7E-04 J	2.9E-02	MG/KG	A06SS11-00	20/94	0.00058 - 0.17	2.9E-02	N/A	1.7E+00 C*	6.7E-02	SSL	NO	BSL
(cont'd)	309-00-2	Aldrin	2.6E-04 J	7.7E-03 J	MG/KG	YS24-SB14-10-11-0410	5/93	0.0017 - 0.087	7.7E-03	N/A	2.9E-02 C*	6.5E-04	SSL	NO	BSL
	319-84-6	**alpha-BHC**	**2.2E-04 J**	**4.6E-01**	**MG/KG**	**YS24-SB14-10-11-0410**	**6/94**	**0.0017 - 0.11**	**4.6E-01**	**N/A**	**7.7E-02 C**	**6.2E-05**	**SSL**	**YES**	**ASL**
	5103-71-9	alpha-Chlordane	1.8E-04 J	1.2E+00 J	MG/KG	A06TP03-02	24/93	0.00042 - 1.2	1.2E+00	N/A	1.6E+00 C*	N/A		NO	BSL
	11097-69-1	**Aroclor-1254**	**5.9E-01**	**7.9E+01**	**MG/KG**	**A06TP03-02**	**5/93**	**0.018 - 79**	**7.9E+01**	**N/A**	**1.1E-01 C****	**8.8E-03**	**SSL**	**YES**	**ASL**
	11096-82-5	**Aroclor-1260**	**6.1E-02 J**	**4.9E+00**	**MG/KG**	**A06TP02-02**	**5/93**	**0.018 - 4.9**	**4.9E+00**	**N/A**	**2.2E-01 C**	**2.4E-02**	**SSL**	**YES**	**ASL**
	319-85-7	beta-BHC	5.2E-04 J	5.4E-03	MG/KG	A06SB05-05	11/94	0.00093 - 0.087	5.4E-03	N/A	2.7E-01 C	2.2E-04	SSL	NO	BSL
	319-86-8	delta-BHC	1.9E-04 J	2.6E-02	MG/KG	YS24-SB14-10-11-0410	12/93	0.00084 - 0.087	2.6E-02	N/A	2.7E-01 C	N/A		NO	BSL
	60-57-1	**Dieldrin**	**2.3E-04 J**	**9.0E-02 J**	**MG/KG**	**A06TP02-02**	**9/94**	**0.00023 - 0.17**	**9.0E-02**	**N/A**	**3.0E-02 C**	**1.7E-04**	**SSL**	**YES**	**ASL**
	959-98-8	Endosulfan I	2.0E-04 J	1.5E-03 J	MG/KG	A06SB05-05D	7/93	0.00038 - 0.087	1.5E-03	N/A	3.7E+01 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	4.2E-04 J	1.5E-03 J	MG/KG	YS24-SB20B-7-8-0410	3/93	0.0034 - 0.17	1.5E-03	N/A	3.7E+01 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	3.8E-04 J	3.6E-03 L	MG/KG	A06TP06-01	4/93	0.0034 - 0.17	3.6E-03	N/A	3.7E+01 N	N/A		NO	BSL
	72-20-8	Endrin	3.8E-04 J	2.9E-02	MG/KG	A06TP03-01	7/93	0.0034 - 0.17	2.9E-02	N/A	1.8E+00 N	4.4E-01	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	3.7E-04 L	1.2E-03 J	MG/KG	YS24-SS31-0410	16/93	0.0034 - 0.17	1.2E-03	N/A	1.8E+00 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	4.4E-04 J	1.4E-03 J	MG/KG	YS24-SS02-0410	4/93	0.0034 - 0.17	1.4E-03	N/A	1.8E+00 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	2.8E-04 J	1.1E-03 J	MG/KG	YS24-SS18-0410	8/93	0.0017 - 0.087	1.1E-03	N/A	5.2E-01 C*	3.6E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	2.4E-04 J	7.6E-02	MG/KG	A06SS11-00	24/93	0.00036 - 0.087	7.6E-02	N/A	1.6E+00 C*	N/A		NO	BSL
	76-44-8	**Heptachlor**	**2.0E-04 J**	**2.0E-01**	**MG/KG**	**YS24-SB14-10-11-0410**	**8/92**	**0.0017 - 0.11**	**2.0E-01**	**N/A**	**1.1E-01 C**	**1.2E-03**	**SSL**	**YES**	**ASL**
	1024-57-3	Heptachlor epoxide	1.8E-04 J	8.8E-04 J	MG/KG	YS24-SB20B-7-8-0410	4/93	0.00018 - 0.087	8.8E-04	N/A	5.3E-02 C*	1.5E-04	SSL	NO	BSL
	72-43-5	Methoxychlor	4.8E-03 J	5.3E-03 J	MG/KG	YS24-SB14-10-11-0410	2/93	0.0012 - 0.87	5.3E-03	N/A	3.1E+01 N	9.9E+00	SSL	NO	BSL
	99-35-4	1,3,5-Trinitrobenzene	4.5E-01 J	1.2E+00	MG/KG	A06SB05-05	3/89	0.00025 - 1.5	1.2E+00	N/A	2.2E+02 N	3.9E+00	SSL	NO	BSL
	118-96-7	**2,4,6-Trinitrotoluene**	**1.2E+00**	**4.1E+00 J**	**MG/KG**	**A06TP05-02**	**3/89**	**0.00025 - 4.1**	**4.1E+00**	**N/A**	**3.6E+00 C****	**1.3E-02**	**SSL**	**YES**	**ASL**
	19406-51-0	4-Amino-2,6-dinitrotoluene	3.7E-01	3.7E-01	MG/KG	A06SB05-05	1/89	0.00025 - 1.5	3.7E-01	N/A	1.5E+01 N	5.6E-02	SSL	NO	BSL
	7429-90-5	**Aluminum**	**1.8E+03**	**3.4E+05**	**MG/KG**	**YS24-SB20B-7-8-0410**	**94/94**	**20.6 - 11600**	**3.4E+05**	**1.2E+04**	**7.7E+03 N**	**5.5E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	**Antimony**	**3.2E-01 J**	**4.6E+00 L**	**MG/KG**	**A06SB05-06**	**29/80**	**0.79 - 4.6**	**4.6E+00**	**1.1E+01**	**3.1E+00 N**	**6.6E-01**	**SSL**	**YES**	**ASL**
	7440-38-2	**Arsenic**	**6.3E-01 J**	**1.5E+02**	**MG/KG**	**YS24-SS31-0410**	**71/94**	**0.64 - 49.5**	**1.5E+02**	**6.4E+00**	**3.9E-01 C***	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.0E+01	3.3E+02	MG/KG	A06TP03-02	94/94	10.3 - 327	3.3E+02	5.3E+01	1.5E+03 N	3.0E+02	SSL	NO	BSL
	7440-41-7	Beryllium	7.0E-02 K	2.4E+00	MG/KG	YS24-SS12-0410	66/94	0.04 - 0.96	2.4E+00	5.9E-01	1.6E+01 N	5.8E+01	SSL	NO	BSL
	7440-43-9	**Cadmium**	**4.0E-02 J**	**7.9E+02**	**MG/KG**	**A06TP03-01**	**54/94**	**0.06 - 786**	**7.9E+02**	**1.5E+00**	**7.0E+00 N**	**1.4E+00**		**YES**	**ASL**
	7440-70-2	Calcium	1.2E+02	2.1E+05	MG/KG	YS24-SB08-0_5-2-0410	94/94	117 - 202000	2.1E+05	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**2.5E+00**	**6.5E+01**	**MG/KG**	**YS24-SB20B-7-8-0410**	**94/94**	**1 - 30.9**	**6.5E+01**	**1.8E+01**	**2.9E-01 C**	**8.3E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**3.8E-01 J**	**1.2E+01**	**MG/KG**	**A06SB05-06**	**93/94**	**0.52 - 12.3**	**1.2E+01**	**9.9E+00**	**2.3E+00 N**	**4.9E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	**Copper**	**7.2E-01**	**1.6E+04**	**MG/KG**	**YS24-SB20B-7-8-0410**	**89/94**	**0.52 - 181**	**1.6E+04**	**4.3E+00**	**3.1E+02 N**	**5.1E+01**	**SSL**	**YES**	**ASL**
	57-12-5	Cyanide	1.4E-01 L	3.5E+00 L	MG/KG	A06SB06-04D	5/94	0.14 - 4.1	3.5E+00	2.7E+00	1.6E+02 N	7.4E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**1.5E+03**	**3.6E+04**	**MG/KG**	**A06SB05-06**	**94/94**	**10.3 - 35800**	**3.6E+04**	**2.0E+04**	**5.5E+03 N**	**6.4E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	3.1E+00	3.4E+02	MG/KG	A06TP03-01	94/94	0.31 - 344	3.4E+02	1.7E+01	4.0E+02 N	N/A		NO	BSL
	7439-95-4	Magnesium	1.3E+02	5.1E+03	MG/KG	YS24-SB121-0410-SO	94/94	128 - 2150	5.1E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**4.8E+00**	**2.9E+03**	**MG/KG**	**YS24-SB20B-7-8-0410**	**94/94**	**1 - 171**	**2.9E+03**	**3.2E+02**	**1.8E+02 N**	N/A		**YES**	**ASL**
	7439-97-6	**Mercury**	**1.8E-02 J**	**4.7E+00**	**MG/KG**	**A06SS11-00**	**37/94**	**0.035 - 4.7**	**4.7E+00**	**1.1E-01**	**2.3E+00 N**	**3.3E-02**	**SSL**	**YES**	**ASL**
	7440-02-0	Nickel	1.2E+00	6.2E+01	MG/KG	A06TP03-02	92/94	0.52 - 62	6.2E+01	9.5E+00	1.5E+02 N	4.8E+01	SSL	NO	BSL
	7440-09-7	Potassium	1.5E+02 J	2.5E+03	MG/KG	YS24-SB10-5-6-0410	87/94	159 - 1580	2.5E+03	7.1E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	5.8E-01 K	7.8E-01 K	MG/KG	A06SS12-00	4/94	0.52 - 0.96	7.8E-01	5.1E-01	3.9E+01 N	9.5E-01	SSL	NO	BSL
	7440-22-4	Silver	3.5E-01 J	8.8E+00	MG/KG	A06TP03-01	10/94	0.21 - 8.8	8.8E+00	2.1E+00	3.9E+01 N	1.6E+00	SSL	NO	BSL

Table 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil*	7440-23-5	Sodium	2.0E+01	2.1E+03	MG/KG	YS24-SB08-0_5-2-0410	89/94	19.6 - 1440	2.1E+03	5.2E+02	N/A	N/A		NO	NUT
Across Site	**7440-62-2**	**Vanadium**	**3.7E+00**	**9.9E+01**	**MG/KG**	**A06SB06-04**	**94/94**	**2.1 - 99.3**	**9.9E+01**	**2.8E+01**	**3.9E+01 N**	**N/A**	**SSL**	**YES**	**ASL**
(cont'd)	7440-66-6	Zinc	4.9E+00 J	1.6E+03	MG/KG	A06TP03-02	94/94	2.1 - 1580	1.6E+03	2.7E+01	2.3E+03 N	6.8E+02	SSL	NO	BSL

* Surface soil & subsurface soil combined
[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values from Cheatham Annex/Yorktown background surface and subsurface soil samples; values represent the > 95% UTL.
[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
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 dibutyl phthalate used as surrogate for di-n-octylphthalate.
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) 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 Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.
[5] Rationale Codes

Selection Reason:	Above Screening Levels (ASL)
	Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)
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
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
S - Concentration exceeds Csat, used Csat as screening value
SSL = Soil Screening Level for Protection of Groundwater, from RSL Table
MG/KG = millograms per kilogram
N/A = Not applicable

Table 2.12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

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
Emissions from Soil* Across Site	120-82-1	1,2,4-Trichlorobenzene	7.7E-06 J	7.7E-06 J	µg/m^3	YS24-SB18-7-8-0410	1/94	N/A	7.7E-06	N/A	2.1E-01 N	N/A	N/A	NO	BSL
	106-46-7	1,4-Dichlorobenzene	3.5E-03 J	3.8E-03 J	µg/m^3	A06TP03-02	2/94	N/A	3.8E-03	N/A	2.2E-01 C	N/A	N/A	NO	BSL
	78-93-3	2-Butanone	2.3E-04 J	5.1E-03	µg/m^3	A06SB03-01D	22/87	N/A	5.1E-03	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	67-64-1	Acetone	1.5E-04 J	4.6E-03	µg/m^3	A06TP02-01	5/94	N/A	4.6E-03	N/A	3.2E+03 N	N/A	N/A	NO	BSL
	71-43-2	Benzene	4.0E-05 K	1.0E-04 K	µg/m^3	YS24-SB14-10-11-0410	3/94	N/A	1.0E-04	N/A	3.1E-01 C	N/A	N/A	NO	BSL
	75-15-0	Carbon disulfide	3.9E-04 K	2.3E-03 K	µg/m^3	YS24-SS06-0410	7/94	N/A	2.3E-03	N/A	7.3E+02 N	N/A	N/A	NO	BSL
	56-23-5	Carbon tetrachloride	9.4E-04 J	9.4E-04 J	µg/m^3	A06TP01-01	1/94	N/A	9.4E-04	N/A	4.1E-01 C	N/A	N/A	NO	BSL
	108-90-7	Chlorobenzene	1.1E-04 J	1.1E-04 J	µg/m^3	A06SS16-00	1/94	N/A	1.1E-04	N/A	5.2E+01 N	N/A	N/A	NO	BSL
	74-87-3	Chloromethane	3.4E-04 J	5.3E-03 K	µg/m^3	YS24-SB20B-7-8-0410	3/94	N/A	5.3E-03	N/A	9.4E+00 N	N/A	N/A	NO	BSL
	100-41-4	Ethylbenzene	9.3E-05 K	6.2E-04	µg/m^3	YS24-SS08-0410	6/94	N/A	6.2E-04	N/A	9.7E-01 C	N/A	N/A	NO	BSL
	98-82-8	Isopropylbenzene	5.4E-04 K	5.4E-04 K	µg/m^3	YS24-SB14-10-11-0410	1/50	N/A	5.4E-04	N/A	4.2E+01 N	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	2.4E-04 J	1.8E-01 J	µg/m^3	YS24-SS03-0410	28/50	N/A	1.8E-01	N/A	N/A	N/A	N/A	NO	NTX
	75-09-2	Methylene chloride	9.6E-04 J	4.8E-04	µg/m^3	A06SB05-05D	8/94	N/A	4.8E-04	N/A	5.2E+00 C	N/A	N/A	NO	BSL
	95-47-6	o-Xylene	4.9E-04 K	1.4E-03 K	µg/m^3	YS24-SB14-10-11-0410	1/50	N/A	1.4E-03	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	100-42-5	Styrene	3.0E-06 J	1.8E-03 K	µg/m^3	YS24-SB14-10-11-0410	2/94	N/A	1.8E-03	N/A	1.0E+03 N	N/A	N/A	NO	BSL
	127-18-4	Tetrachloroethene	6.0E-04 J	1.5E-04 J	µg/m^3	A06TP04-02 : A06TP06-01	2/94	N/A	1.5E-04	N/A	4.1E-01 C	N/A	N/A	NO	BSL
	108-88-3	Toluene	1.3E-04 J	1.8E-03 J	µg/m^3	24SS04	5/94	N/A	1.8E-03	N/A	5.2E+03 N	N/A	N/A	NO	BSL
	1330-20-7	Xylene, total	1.2E-04 J	8.2E-04 K	µg/m^3	YS24-SB14-10-11-0410	3/94	N/A	8.2E-04	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	121-14-2	2,4-Dinitrotoluene	7.1E-08 J	1.5E-06 J	µg/m^3	A06TP05-02	5/94	N/A	1.5E-06	N/A	2.7E-02 C	N/A	N/A	NO	BSL
	606-20-2	2,6-Dinitrotoluene	2.1E-07 J	5.4E-07	µg/m^3	A06SB05-05	3/94	N/A	5.4E-07	N/A	N/A	N/A	N/A	NO	NTX
	91-58-7	2-Chloronaphthalene	5.8E-04 J	6.2E-04 J	µg/m^3	A06TP02-02	2/94	N/A	6.2E-04	N/A	N/A	N/A	N/A	NO	NTX
	106-47-8	4-Chloroaniline	1.3E-07 J	1.3E-07 J	µg/m^3	A06SS11-00	1/94	N/A	1.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	208-96-8	Acenaphthylene	1.9E-08 J	1.9E-08 J	µg/m^3	YS24-SS31-0410	1/94	N/A	1.9E-08	N/A	N/A	N/A	N/A	NO	NTX
	120-12-7	Anthracene	4.7E-05 J	4.7E-05 J	µg/m^3	YS24-SS31-0410	1/94	N/A	4.7E-05	N/A	N/A	N/A	N/A	NO	NTX
	100-52-7	Benzaldehyde	9.1E-04 J	1.6E-03 J	µg/m^3	YS24-SB14-10-11-0410	2/50	N/A	1.6E-03	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	2.4E-08 J	2.4E-08 J	µg/m^3	YS24-SS31-0410	13/94	N/A	2.4E-08	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	1.6E-08 J	1.3E-07 J	µg/m^3	YS24-SB04-0_5-2-0410 : YS24-SS31-0410	14/94	N/A	1.3E-07	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.7E-08 K	2.2E-07	µg/m^3	YS24-SB04-0_5-2-0410	16/94	N/A	2.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.6E-08 J	6.4E-07 J	µg/m^3	A06SS09-00	13/94	N/A	6.4E-07	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	2.1E-08 J	2.2E-07	µg/m^3	YS24-SS31-0410	15/94	N/A	2.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.0E-08 J	2.6E-06	µg/m^3	A06SS11-00	38/94	N/A	2.6E-06	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	3.2E-08 J	8.8E-07	µg/m^3	A06SB06-04	5/94	N/A	8.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	2.4E-08 J	1.9E-07	µg/m^3	YS24-SS31-0410	14/94	N/A	1.9E-07	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	3.3E-08 J	3.3E-08 J	µg/m^3	YS24-SB04-0_5-2-0410 : YS24-SS31-0410	2/94	N/A	3.3E-08	N/A	8.0E-04 C	N/A	N/A	NO	BSL
	84-74-2	Di-n-butylphthalate	1.8E-08 J	3.4E-06	µg/m^3	A06SS12-00D	38/94	N/A	3.4E-06	N/A	N/A	N/A	N/A	NO	NTX
	117-84-0	Di-n-octylphthalate	7.2E-08 J	3.3E-07	µg/m^3	YS24-SS01P-0410	2/94	N/A	3.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	1.7E-08 J	1.8E-07	µg/m^3	YS24-SS31-0410	21/94	N/A	1.8E-07	N/A	1.0E+00 C	N/A	N/A	NO	BSL

Table 2.12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

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
Emissions from Soil* Across Site (cont'd)	193-39-5	Indeno(1,2,3-cd)pyrene	4.6E-08 J	1.1E-07 J	µg/m^3	YS24-SB04-0_5-2-0410 : YS24-SS31-0410	3/94	N/A	1.1E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	621-64-7	n-Nitroso-di-n-propylamine	6.8E-08 J	6.8E-08 J	µg/m^3	A06TP03-02	1/94	N/A	6.8E-08	N/A	1.2E-03 C	N/A	N/A	NO	BSL
	86-30-6	n-Nitrosodiphenylamine	6.8E-08 J	6.8E-08 J	µg/m^3	A06TP03-02	1/94	N/A	6.8E-08	N/A	9.4E-01 C	N/A	N/A	NO	BSL
	85-01-8	Phenanthrene	1.8E-08 J	6.5E-08 J	µg/m^3	YS24-SS08-0410	16/94	N/A	6.5E-08	N/A	N/A	N/A	N/A	NO	NTX
	129-00-0	Pyrene	7.4E-06 J	9.8E-05	µg/m^3	YS24-SS31-0410	22/94	N/A	9.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	72-54-8	4,4'-DDD	3.1E-10 L	2.6E-08	µg/m^3	A06SS11-00	8/94	N/A	2.6E-08	N/A	3.5E-02 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	1.9E-10 J	8.1E-09 J	µg/m^3	A06SS11-00	19/94	N/A	8.1E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	4.2E-10 J	2.1E-08	µg/m^3	A06SS11-00	20/94	N/A	2.1E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	309-00-2	Aldrin	1.9E-10 J	5.7E-09 J	µg/m^3	YS24-SB14-10-11-0410	5/93	N/A	5.7E-09	N/A	5.0E-04 C	N/A	N/A	NO	BSL
	319-84-6	alpha-BHC	1.6E-10 J	3.4E-07	µg/m^3	YS24-SB14-10-11-0410	6/94	N/A	3.4E-07	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	1.3E-10 J	8.8E-07 J	µg/m^3	A06TP03-02	24/93	N/A	8.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	11097-69-1	Aroclor-1254	4.3E-07	5.8E-05	µg/m^3	A06TP03-02	5/93	N/A	5.8E-05	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	11096-82-5	Aroclor-1260	4.5E-08 J	3.6E-06	µg/m^3	A06TP02-02	5/93	N/A	3.6E-06	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	319-85-7	beta-BHC	3.8E-10 J	4.0E-09	µg/m^3	A06SB05-05	11/94	N/A	4.0E-09	N/A	4.6E-03 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	1.4E-10 J	1.9E-08	µg/m^3	YS24-SB14-10-11-0410	12/93	N/A	1.9E-08	N/A	N/A	N/A	N/A	NO	NTX
	60-57-1	Dieldrin	1.7E-10 J	6.6E-08 J	µg/m^3	A06TP02-02	9/94	N/A	6.6E-08	N/A	5.3E-04 C	N/A	N/A	NO	BSL
	959-98-8	Endosulfan I	1.5E-10 J	1.1E-09 J	µg/m^3	A06SB05-05D	7/93	N/A	1.1E-09	N/A	N/A	N/A	N/A	NO	NTX
	33213-65-9	Endosulfan II	3.1E-10 J	1.1E-09 J	µg/m^3	YS24-SB20B-7-8-0410	3/93	N/A	1.1E-09	N/A	N/A	N/A	N/A	NO	NTX
	1031-07-8	Endosulfan sulfate	2.8E-10 J	2.6E-09 L	µg/m^3	A06TP06-01	4/93	N/A	2.6E-09	N/A	N/A	N/A	N/A	NO	NTX
	72-20-8	Endrin	2.8E-10 J	2.1E-08	µg/m^3	A06TP03-01	7/93	N/A	2.1E-08	N/A	N/A	N/A	N/A	NO	NTX
	7421-93-4	Endrin aldehyde	2.7E-10 L	8.8E-10 J	µg/m^3	YS24-SS31-0410	16/93	N/A	8.8E-10	N/A	N/A	N/A	N/A	NO	NTX
	53494-70-5	Endrin ketone	3.2E-10 J	1.0E-09 J	µg/m^3	YS24-SS02-0410	4/93	N/A	1.0E-09	N/A	N/A	N/A	N/A	NO	NTX
	58-89-9	gamma-BHC (Lindane)	2.1E-10 J	8.1E-10 J	µg/m^3	YS24-SS18-0410	8/93	N/A	8.1E-10	N/A	7.8E-03 C	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	1.8E-10 J	5.6E-08	µg/m^3	A06SS11-00	24/93	N/A	5.6E-08	N/A	N/A	N/A	N/A	NO	NTX
	76-44-8	Heptachlor	1.5E-10 J	1.5E-07	µg/m^3	YS24-SB14-10-11-0410	8/92	N/A	1.5E-07	N/A	1.9E-03 C	N/A	N/A	NO	BSL
	1024-57-3	Heptachlor epoxide	1.3E-10 J	6.5E-10 J	µg/m^3	YS24-SB20B-7-8-0410	4/93	N/A	6.5E-10	N/A	9.4E-04 C	N/A	N/A	NO	BSL
	72-43-5	Methoxychlor	3.5E-09 J	3.9E-09 J	µg/m^3	YS24-SB14-10-11-0410	2/93	N/A	3.9E-09	N/A	N/A	N/A	N/A	NO	NTX
	99-35-4	1,3,5-Trinitrobenzene	3.3E-07 J	8.8E-07	µg/m^3	A06SB05-05	3/89	N/A	8.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	118-96-7	2,4,6-Trinitrotoluene	8.8E-07	3.0E-06 J	µg/m^3	A06TP05-02	3/89	N/A	3.0E-06	N/A	N/A	N/A	N/A	NO	NTX
	19406-51-0	4-Amino-2,6-dinitrotoluene	2.7E-07	2.7E-07	µg/m^3	A06SB05-05	1/89	N/A	2.7E-07	N/A	N/A	N/A	N/A	NO	NTX
	7429-90-5	Aluminum	1.3E-03	2.5E-01	µg/m^3	YS24-SB20B-7-8-0410	94/94	N/A	2.5E-01	N/A	5.2E-01 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	2.4E-07 J	3.4E-06 L	µg/m^3	A06SB05-06	29/80	N/A	3.4E-06	N/A	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	4.6E-07 J	1.1E-04	µg/m^3	YS24-SS31-0410	71/94	N/A	1.1E-04	N/A	5.7E-04 C*	N/A	N/A	NO	BSL
	7440-39-3	Barium	7.6E-06	2.4E-04	µg/m^3	A06TP03-02	94/94	N/A	2.4E-04	N/A	5.2E-04 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	5.1E-08 K	1.8E-06	µg/m^3	YS24-SS12-0410	66/94	N/A	1.8E-06	N/A	1.0E-03 C*	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	2.9E-08 J	5.8E-04	µg/m^3	A06TP03-01	54/94	N/A	5.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	7440-70-2	Calcium	8.6E-05	1.6E-01	µg/m^3	YS24-SB08-0_5-2-0410	94/94	N/A	1.6E-01	N/A	N/A	N/A	N/A	NO	NUT

Table 2.12

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

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
Emissions from	**7440-47-3**	**Chromium**	**1.8E-06**	**4.8E-05**	μg/m^3	**YS24-SB20B-7-8-0410**	**94/94**	**N/A**	**4.8E-05**	**N/A**	**1.1E-05 C**	**N/A**	**N/A**	**YES**	**ASL**
Soil*	7440-48-4	Cobalt	2.8E-07 J	9.0E-06	μg/m^3	A06SB05-06	93/94	N/A	9.0E-06	N/A	2.7E-04 C*	N/A	N/A	NO	BSL
Across Site	7440-50-8	Copper	5.3E-07	1.1E-02	μg/m^3	YS24-SB20B-7-8-0410	89/94	N/A	1.1E-02	N/A	N/A	N/A	N/A	NO	NTX
(cont'd)	57-12-5	Cyanide	1.0E-07 L	2.6E-06 L	μg/m^3	A06SB06-04D	5/94	N/A	2.6E-06	N/A	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	1.1E-03	2.6E-02	μg/m^3	A06SB05-06	94/94	N/A	2.6E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	2.3E-06	2.5E-04	μg/m^3	A06TP03-01	94/94	N/A	2.5E-04	N/A	N/A	N/A	N/A	NO	NTX
	7439-95-4	Magnesium	9.4E-05	3.7E-03	μg/m^3	YS24-SB121-0410-SO	94/94	N/A	3.7E-03	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	3.5E-06	2.1E-03	μg/m^3	YS24-SB20B-7-8-0410	94/94	N/A	2.1E-03	N/A	N/A	N/A	N/A	NO	NTX
	7439-97-6	Mercury	1.3E-08 J	3.5E-06	μg/m^3	A06SS11-00	37/94	N/A	3.5E-06	N/A	3.1E-04 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	8.8E-07	4.6E-05	μg/m^3	A06TP03-02	92/94	N/A	4.6E-05	N/A	9.4E-03 C*	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.1E-04 J	1.8E-03	μg/m^3	YS24-SB10-5-6-0410	87/94	N/A	1.8E-03	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	4.3E-07 K	5.7E-07 K	μg/m^3	A06SS12-00	4/94	N/A	5.7E-07	N/A	2.1E-02 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	2.6E-07 J	6.5E-06	μg/m^3	A06TP03-01	10/94	N/A	6.5E-06	N/A	N/A	N/A	N/A	NO	NTX
	7440-23-5	Sodium	1.4E-05	1.5E-03	μg/m^3	YS24-SB08-0_5-2-0410	89/94	N/A	1.5E-03	N/A	N/A	N/A	N/A	NO	NUT
	7440-62-2	Vanadium	2.7E-06	7.3E-05	μg/m^3	A06SB06-04	94/94	N/A	7.3E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-66-6	Zinc	3.6E-06 J	1.2E-03	μg/m^3	A06TP03-02	94/94	N/A	1.2E-03	N/A	N/A	N/A	N/A	NO	NTX

* Surface soil & subsurface soil combined

[1] Minimum/Maximum calculated air concentrations from soil concentrations. Air concentrations calculated as Cair = Csoil*1000*(1/PEF+1/VF)
VF calculated for volatile and semi-volatile analytes identified as volatile in the Regional Screening Levels for Chemical Contaminants at Superfund Sites (Oak Ridge National Laboratory, June 2011). VF calculated on Table 2 Supplement. PEF = 1.36 x 10^9 m^3/kg.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Air.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10).
RSL value for technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) used as surrogate for chromium.
RSL value for Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[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
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
N = Noncarcinogenic
μg/m^3 = micrograms per cubic meter
N/A = Not applicable

Table 2.13

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil* Outside Waste Area	120-82-1	1,2,4-Trichlorobenzene	3.3E-04 J	3.3E-04 J	MG/KG	YS24-SB18-7-8-0410	1/72	0.0015 - 0.45	3.3E-04	N/A	6.2E+00 C**	6.8E-03	SSL	NO	BSL
	106-46-7	1,4-Dichlorobenzene	5.2E-02 J	5.2E-02 J	MG/KG	A06SS13-00	1/72	0.0015 - 0.45	5.2E-02	N/A	2.4E+00 C	4.1E-04	SSL	NO	BSL
	78-93-3	2-Butanone	4.0E-03 J	8.8E-02	MG/KG	A06SB03-01D	18/67	0.0037 - 0.088	8.8E-02	N/A	2.8E+03 N	1.5E+00	SSL	NO	BSL
	67-64-1	Acetone	3.0E-03 J	9.0E-03 J	MG/KG	A06SB10-07	3/72	0.003 - 0.023	9.0E-03	N/A	6.1E+03 N	4.5E+00	SSL	NO	BSL
	71-43-2	Benzene	2.0E-04 K	2.4E-04 J	MG/KG	YS24-SS08-0410	2/72	0.0015 - 0.014	2.4E-04	N/A	1.1E+00 C*	2.1E-04	SSL	NO	BSL
	75-15-0	Carbon disulfide	7.1E-04 J	3.8E-03 K	MG/KG	YS24-SS06-0410	6/72	0.0015 - 0.014	3.8E-03	N/A	8.2E+01 NS	3.1E-01	SSL	NO	BSL
	108-90-7	Chlorobenzene	1.0E-03 J	1.0E-03 J	MG/KG	A06SS16-00	1/72	0.001 - 0.014	1.0E-03	N/A	2.9E+01 N	6.2E-02	SSL	NO	BSL
	74-87-3	Chloromethane	6.6E-04 K	6.6E-04 K	MG/KG	YS24-SB02P-0_5-2-0410	1/72	0.0015 - 0.014	6.6E-04	N/A	1.2E+01 N	4.9E-02	SSL	NO	BSL
	100-41-4	Ethylbenzene	1.1E-03 K	5.0E-03	MG/KG	YS24-SS08-0410	5/72	0.0015 - 0.014	5.0E-03	N/A	5.4E+00 C	1.7E-03	SSL	NO	BSL
	79-20-9	Methyl acetate	2.9E-03 K	2.1E+00 J	MG/KG	YS24-SS03-0410	24/42	0.0015 - 0.2	2.1E+00	N/A	7.8E+03 N	7.5E+00	SSL	NO	BSL
	75-09-2	Methylene chloride	3.0E-03 J	4.0E-02	MG/KG	A06SB05-05D	6/72	0.0015 - 0.04	4.0E-02	N/A	1.1E+01 C	1.2E-03	SSL	NO	BSL
	100-42-5	Styrene	4.0E-05 J	4.0E-05 J	MG/KG	YS24-SS22-0410	1/72	0.0015 - 0.014	4.0E-05	N/A	6.3E+02 N	1.8E+00	SSL	NO	BSL
	108-88-3	Toluene	8.0E-04 J	6.0E-03 J	MG/KG	24SS04	5/72	0.0008 - 0.014	6.0E-03	N/A	5.0E+02 N	1.6E+00	SSL	NO	BSL
	1330-20-7	Xylene, total	1.0E-03 J	1.0E-03 J	MG/KG	24SS03	1/72	0.0015 - 0.014	1.0E-03	N/A	6.3E+01 N	2.0E-01	SSL	NO	BSL
	121-14-2	2,4-Dinitrotoluene	9.7E-02 J	1.5E+00	MG/KG	YS24-SS17-0410	4/72	0.00026 - 1.5	1.5E+00	N/A	1.6E+00 C*	2.9E-04	SSL	NO	BSL
	606-20-2	2,6-Dinitrotoluene	5.0E-01	7.3E-01	MG/KG	A06SB05-05	2/72	0.00025 - 3	7.3E-01	N/A	6.1E+00 N	5.0E-02	SSL	NO	BSL
	91-58-7	2-Chloronaphthalene	6.6E-02 J	6.6E-02 J	MG/KG	YS24-SS11-0410	1/72	0.18 - 0.45	6.6E-02	N/A	1.8E+02 N	1.5E+01	SSL	NO	BSL
	106-47-8	4-Chloroaniline	1.8E-01 J	1.8E-01 J	MG/KG	A06SS11-00	1/72	0.18 - 0.48	1.8E-01	N/A	2.4E+00 C	1.4E-04	SSL	NO	BSL
	208-96-8	Acenaphthylene	2.6E-02 J	2.6E-02 J	MG/KG	YS24-SS31-0410	1/72	0.18 - 0.45	2.6E-02	N/A	3.4E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	3.5E-02 J	3.5E-02 J	MG/KG	YS24-SS31-0410	1/72	0.18 - 0.45	3.5E-02	N/A	1.7E+03 N	3.6E+02	SSL	NO	BSL
	100-52-7	Benzaldehyde	2.9E-02 J	2.9E-02 J	MG/KG	YS24-SS02-0410	1/42	0.094 - 0.25	2.9E-02	N/A	7.8E+02 N	8.1E-01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**3.2E-02 J**	**1.6E-01 J**	**MG/KG**	**YS24-SS31-0410**	**12/72**	**0.04 - 0.45**	**1.6E-01**	**N/A**	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**2.2E-02 J**	**1.8E-01 J**	**MG/KG**	**YS24-SB04-0_5-2-0410 : YS24-SS31-0410**	**13/72**	**0.09 - 0.45**	**1.8E-01**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**2.3E-02 K**	**3.0E-01**	**MG/KG**	**YS24-SB04-0_5-2-0410**	**14/72**	**0.046 - 0.45**	**3.0E-01**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.2E-02 J	8.7E-01 J	MG/KG	A06SS09-00	11/72	0.18 - 0.87	8.7E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**3.1E-02 J**	**3.0E-01**	**MG/KG**	**YS24-SS31-0410**	**13/72**	**0.05 - 0.45**	**3.0E-01**	**N/A**	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**CPAH**
	117-81-7	bis(2-Ethylhexyl)phthalate	4.1E-02 J	3.6E+00	MG/KG	A06SS11-00	27/72	0.045 - 3.6	3.6E+00	N/A	3.5E+01 C*	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	4.4E-02 J	1.2E+00	MG/KG	A06SB06-04	4/72	0.18 - 1.2	1.2E+00	N/A	2.6E+02 C*	5.1E-01	SSL	NO	BSL
	218-01-9	**Chrysene**	**3.3E-02 J**	**2.6E-01**	**MG/KG**	**YS24-SS31-0410**	**13/72**	**0.058 - 0.45**	**2.6E-01**	**N/A**	**1.5E+01 C**	**1.1E+00**	**SSL**	**YES**	**CPAH**
	53-70-3	**Dibenz(a,h)anthracene**	**4.5E-02 J**	**4.5E-02 J**	**MG/KG**	**YS24-SB04-0_5-2-0410 : YS24-SS31-0410**	**2/72**	**0.18 - 0.45**	**4.5E-02**	**N/A**	**1.5E-02 C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	84-74-2	Di-n-butylphthalate	2.5E-02 J	4.6E+00	MG/KG	A06SS12-00D	26/72	0.045 - 4.6	4.6E+00	N/A	6.1E+02 N	9.2E+00	SSL	NO	BSL
	117-84-0	Di-n-octylphthalate	9.8E-02 J	4.5E-01	MG/KG	YS24-SS01P-0410	2/72	0.098 - 0.45	4.5E-01	N/A	6.1E+02 N	N/A		NO	BSL
	206-44-0	Fluoranthene	2.3E-02 J	2.5E-01	MG/KG	YS24-SS31-0410	20/72	0.088 - 0.45	2.5E-01	N/A	2.3E+02 N	1.6E+02	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**6.3E-02 J**	**1.5E-01 J**	**MG/KG**	**YS24-SB04-0_5-2-0410 : YS24-SS31-0410**	**3/72**	**0.063 - 0.45**	**1.5E-01**	**N/A**	**1.5E-01 C**	**1.2E-01**	**SSL**	**YES**	**ASL**
	85-01-8	Phenanthrene	2.5E-02 J	8.8E-02 J	MG/KG	YS24-SS08-0410	16/72	0.064 - 0.45	8.8E-02	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	3.1E-02 J	3.3E-01	MG/KG	YS24-SS31-0410	19/72	0.1 - 0.45	3.3E-01	N/A	1.7E+02 N	1.2E+02	SSL	NO	BSL
	72-54-8	4,4'-DDD	4.2E-04 L	3.5E-02	MG/KG	A06SS11-00	6/72	0.00054 - 0.035	3.5E-02	N/A	2.0E+00 C	6.6E-02	SSL	NO	BSL

Table 2.13
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil*	72-55-9	4,4'-DDE	2.6E-04 J	1.1E-02 J	MG/KG	A06SS11-00	16/72	0.00026 - 0.011	1.1E-02	N/A	1.4E+00 C	4.7E-02	SSL	NO	BSL
Outside	50-29-3	4,4'-DDT	5.7E-04 J	2.9E-02	MG/KG	A06SS11-00	17/72	0.00058 - 0.029	2.9E-02	N/A	1.7E+00 C*	6.7E-02	SSL	NO	BSL
Waste Area	309-00-2	Aldrin	2.6E-04 J	4.7E-04 J	MG/KG	YS24-SS07-0410	4/71	0.0017 - 0.0099	4.7E-04	N/A	2.9E-02 C*	6.5E-04	SSL	NO	BSL
(cont'd)	319-84-6	alpha-BHC	2.2E-04 J	1.9E-03 L	MG/KG	A06SB05-01	4/72	0.0017 - 0.0099	1.9E-03	N/A	7.7E-02 C	6.2E-05	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	1.8E-04 J	7.4E-02 J	MG/KG	A06SS11-00	18/71	0.00042 - 0.074	7.4E-02	N/A	1.6E+00 C*	N/A		NO	BSL
	319-85-7	beta-BHC	7.7E-04 J	5.4E-03	MG/KG	A06SB05-05	7/72	0.00093 - 0.0099	5.4E-03	N/A	2.7E-01 C	2.2E-04	SSL	NO	BSL
	319-86-8	delta-BHC	1.9E-04 J	9.7E-04 J	MG/KG	YS24-SS25-0410	10/71	0.0017 - 0.0099	9.7E-04	N/A	2.7E-01 C	N/A		NO	BSL
	60-57-1	Dieldrin	2.3E-04 J	6.6E-03 J	MG/KG	A06SS11-00	6/72	0.00023 - 0.0066	6.6E-03	N/A	3.0E-02 C	1.7E-04	SSL	NO	BSL
	959-98-8	Endosulfan I	2.0E-04 J	1.5E-03 J	MG/KG	A06SB05-05D	7/71	0.00038 - 0.0099	1.5E-03	N/A	3.7E+01 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	4.2E-04 J	5.2E-04 L	MG/KG	YS24-SS02-0410	2/71	0.0034 - 0.019	5.2E-04	N/A	3.7E+01 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	3.8E-04 J	1.5E-03 J	MG/KG	YS24-SS02-0410	3/71	0.0034 - 0.019	1.5E-03	N/A	3.7E+01 N	N/A		NO	BSL
	72-20-8	Endrin	3.8E-04 J	5.6E-04 J	MG/KG	YS24-SS25-0410	4/71	0.0034 - 0.019	5.6E-04	N/A	1.8E+00 N	4.4E-01	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	3.7E-04 L	1.2E-03 J	MG/KG	YS24-SS31-0410	15/71	0.0034 - 0.019	1.2E-03	N/A	1.8E+00 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	4.4E-04 J	1.4E-03 J	MG/KG	YS24-SS02-0410	4/71	0.0034 - 0.019	1.4E-03	N/A	1.8E+00 N	N/A		NO	BSL
	58-89-9	gamma-BHC (Lindane)	2.8E-04 J	1.1E-03 J	MG/KG	YS24-SS18-0410	7/71	0.0017 - 0.0099	1.1E-03	N/A	5.2E-01 C*	3.6E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	2.4E-04 J	7.6E-02	MG/KG	A06SS11-00	19/71	0.00036 - 0.076	7.6E-02	N/A	1.6E+00 C*	N/A		NO	BSL
	76-44-8	Heptachlor	2.0E-04 J	9.4E-04 L	MG/KG	YS24-SS11P-0410	6/71	0.0017 - 0.0099	9.4E-04	N/A	1.1E-01 C	1.2E-03	SSL	NO	BSL
	1024-57-3	Heptachlor epoxide	1.8E-04 J	4.9E-04 L	MG/KG	YS24-SS02-0410	3/71	0.00018 - 0.0099	4.9E-04	N/A	5.3E-02 C*	1.5E-04	SSL	NO	BSL
	72-43-5	Methoxychlor	4.8E-03 J	4.8E-03 J	MG/KG	YS24-SS02-0410	1/71	0.0012 - 0.099	4.8E-03	N/A	3.1E+01 N	9.9E+00	SSL	NO	BSL
	99-35-4	1,3,5-Trinitrobenzene	6.6E-01	1.2E+00	MG/KG	A06SB05-05	2/67	0.00025 - 1.5	1.2E+00	N/A	2.2E+02 N	3.9E+00	SSL	NO	BSL
	118-96-7	2,4,6-Trinitrotoluene	1.2E+00	3.4E+00	MG/KG	A06SB05-05	2/67	0.00025 - 3.4	3.4E+00	N/A	3.6E+00 C**	1.3E-02	SSL	NO	BSL
	19406-51-0	4-Amino-2,6-dinitrotoluene	3.7E-01	3.7E-01	MG/KG	A06SB05-05	1/67	0.00025 - 1.5	3.7E-01	N/A	1.5E+01 N	5.6E-02	SSL	NO	BSL
	7429-90-5	**Aluminum**	**1.8E+03**	**1.2E+04**	**MG/KG**	**YS24-SB11-5-6-0410 : YS24-SB13-5-6-0410**	**72/72**	**20.6 - 9170**	**1.2E+04**	**1.2E+04**	**7.7E+03 N**	**5.5E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	**Antimony**	**3.2E-01 J**	**4.6E+00 L**	**MG/KG**	**A06SB05-06**	**23/66**	**0.79 - 4.6**	**4.6E+00**	**1.1E+01**	**3.1E+00 N**	**6.6E-01**	**SSL**	**YES**	**ASL**
	7440-38-2	**Arsenic**	**6.3E-01 J**	**1.5E+02**	**MG/KG**	**YS24-SS31-0410**	**54/72**	**0.64 - 49.5**	**1.5E+02**	**6.4E+00**	**3.9E-01 C***	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.0E+01	1.1E+02	MG/KG	YS24-SS12-0410	72/72	10.3 - 51.3	1.1E+02	5.3E+01	1.5E+03 N	3.0E+02	SSL	NO	BSL
	7440-41-7	Beryllium	7.0E-02 K	2.4E+00	MG/KG	YS24-SS12-0410	53/72	0.04 - 0.89	2.4E+00	5.9E-01	1.6E+01 N	5.8E+01	SSL	NO	BSL
	7440-43-9	Cadmium	4.0E-02 J	4.3E+00	MG/KG	A06SS17-00	40/72	0.06 - 4.3	4.3E+00	1.5E+00	7.0E+00 N	1.4E+00	SSL	NO	BSL
	7440-70-2	Calcium	1.2E+02	2.1E+05	MG/KG	YS24-SB08-0_5-2-0410	72/72	117 - 202000	2.1E+05	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**2.5E+00**	**4.3E+01**	**MG/KG**	**YS24-SB11-5-6-0410**	**72/72**	**1 - 30.9**	**4.3E+01**	**1.8E+01**	**2.9E-01 C**	**8.3E-04**	**SSL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**3.8E-01 J**	**1.2E+01**	**MG/KG**	**A06SB05-06**	**72/72**	**0.52 - 12.3**	**1.2E+01**	**9.9E+00**	**2.3E+00 N**	**4.9E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.2E+00	1.4E+02	MG/KG	A06SS11-00	67/72	0.52 - 139	1.4E+02	4.3E+00	3.1E+02 N	5.1E+01	SSL	NO	BSL
	57-12-5	Cyanide	1.4E-01 L	3.5E+00 L	MG/KG	A06SB06-04D	5/72	0.14 - 3.5	3.5E+00	2.7E+00	1.6E+02 N	7.4E+00	SSL	NO	BSL
	7439-89-6	**Iron**	**1.5E+03**	**3.6E+04**	**MG/KG**	**A06SB05-06**	**72/72**	**10.3 - 35800**	**3.6E+04**	**2.0E+04**	**5.5E+03 N**	**6.4E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	3.3E+00	4.7E+01	MG/KG	YS24-SS17-0410	72/72	0.31 - 34.6	4.7E+01	1.7E+01	4.0E+02 N	N/A		NO	BSL
	7439-95-4	Magnesium	1.3E+02	2.8E+03	MG/KG	YS24-SB08-0_5-2-0410	72/72	133 - 2150	2.8E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**4.8E+00**	**9.6E+02**	**MG/KG**	**YS24-SS12-0410**	**72/72**	**1 - 151**	**9.6E+02**	**3.2E+02**	**1.8E+02 N**	**N/A**		**YES**	**ASL**

Table 2.13
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: 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
Soil*	**7439-97-6**	**Mercury**	**1.8E-02 J**	**4.7E+00**	**MG/KG**	**A06SS11-00**	**31/72**	**0.035 - 4.7**	**4.7E+00**	**1.1E-01**	**2.3E+00 N**	**3.3E-02**	**SSL**	**YES**	**ASL**
Outside	7440-02-0	Nickel	1.2E+00	2.7E+01	MG/KG	A06SB05-06	70/72	0.52 - 26.7	2.7E+01	9.5E+00	1.5E+02 N	4.8E+01	SSL	NO	BSL
Waste Area	7440-09-7	Potassium	1.5E+02 J	2.5E+03	MG/KG	YS24-SB10-5-6-0410	66/72	162 - 1580	2.5E+03	7.1E+02	N/A	N/A		NO	NUT
(cont'd)	7782-49-2	Selenium	5.8E-01 K	7.8E-01 K	MG/KG	A06SS12-00	3/72	0.52 - 0.92	7.8E-01	5.1E-01	3.9E+01 N	9.5E-01	SSL	NO	BSL
	7440-22-4	Silver	3.5E-01 J	8.1E+00	MG/KG	A06SS11-00	5/72	0.21 - 8.1	8.1E+00	2.1E+00	3.9E+01 N	1.6E+00	SSL	NO	BSL
	7440-23-5	Sodium	2.0E+01	2.1E+03	MG/KG	YS24-SB08-0_5-2-0410	67/72	19.8 - 1440	2.1E+03	5.2E+02	N/A	N/A		NO	NUT
	7440-62-2	**Vanadium**	**3.7E+00**	**9.9E+01**	**MG/KG**	**A06SB06-04**	**72/72**	**2.1 - 99.3**	**9.9E+01**	**2.8E+01**	**3.9E+01 N**	**N/A**		**YES**	**ASL**
	7440-66-6	Zinc	4.9E+00 J	7.6E+01 J	MG/KG	A06SB05-06	72/72	2.1 - 76	7.6E+01	2.7E+01	2.3E+03 N	6.8E+02	SSL	NO	BSL

* Surface soil & subsurface soil combined
[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values from Cheatham Annex/Yorktown background surface and subsurface soil samples; values represent the > 95% UTL.
[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
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 technical chlordane used as surrogate for alpha-chlordane.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Chromium(VI) 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 Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.
[5] Rationale Codes

Selection Reason:	Above Screening Levels (ASL)
	Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)
Deletion Reason:	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
S - Concentration exceeds Csat, used Csat as screening value
SSL = Soil Screening Level for Protection of Groundwater, from RSL Table
MG/KG = millograms per kilogram
N/A = Not applicable

Table 2.14
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

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
Soil* Outside Waste Area	120-82-1	1,2,4-Trichlorobenzene	7.7E-06 J	7.7E-06 J	µg/m^3	YS24-SB18-7-8-0410	1/72	N/A	7.7E-06	N/A	2.1E-01 N	N/A	N/A	NO	BSL
	106-46-7	1,4-Dichlorobenzene	3.5E-03 J	3.5E-03 J	µg/m^3	A06SS13-00	1/72	N/A	3.5E-03	N/A	2.2E-01 C	N/A	N/A	NO	BSL
	78-93-3	2-Butanone	2.3E-04 J	5.1E-03	µg/m^3	A06SB03-01D	18/67	N/A	5.1E-03	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	67-64-1	Acetone	1.5E-04 J	4.6E-04 J	µg/m^3	A06SB10-07	3/72	N/A	4.6E-04	N/A	3.2E+03 N	N/A	N/A	NO	BSL
	71-43-2	Benzene	4.0E-05 K	4.8E-05 J	µg/m^3	YS24-SS08-0410	2/72	N/A	4.8E-05	N/A	3.1E-01 C	N/A	N/A	NO	BSL
	75-15-0	Carbon disulfide	4.3E-04 J	2.3E-03 K	µg/m^3	YS24-SS06-0410	6/72	N/A	2.3E-03	N/A	7.3E+02 N	N/A	N/A	NO	BSL
	108-90-7	Chlorobenzene	1.1E-04 J	1.1E-04 J	µg/m^3	A06SS16-00	1/72	N/A	1.1E-04	N/A	5.2E+01 N	N/A	N/A	NO	BSL
	74-87-3	Chloromethane	3.9E-04 K	3.9E-04 K	µg/m^3	YS24-SB02P-0_5-2-0410	1/72	N/A	3.9E-04	N/A	9.4E+00 N	N/A	N/A	NO	BSL
	100-41-4	Ethylbenzene	1.4E-04 K	6.2E-04	µg/m^3	YS24-SS08-0410	5/72	N/A	6.2E-04	N/A	9.7E-01 C	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	2.5E-04 K	1.8E-01 J	µg/m^3	YS24-SS03-0410	24/42	N/A	1.8E-01	N/A	N/A	N/A	N/A	NO	NTX
	75-09-2	Methylene chloride	9.6E-04 J	1.3E-02	µg/m^3	A06SB05-05D	6/72	N/A	1.3E-02	N/A	5.2E+00 C	N/A	N/A	NO	BSL
	100-42-5	Styrene	3.0E-06 J	3.0E-06 J	µg/m^3	YS24-SS22-0410	1/72	N/A	3.0E-06	N/A	1.0E+03 N	N/A	N/A	NO	BSL
	108-88-3	Toluene	1.3E-04 J	9.8E-04 J	µg/m^3	24SS04	5/72	N/A	9.8E-04	N/A	5.2E+03 N	N/A	N/A	NO	BSL
	1330-20-7	Xylene, total	1.2E-04 J	1.2E-04 J	µg/m^3	24SS03	1/72	N/A	1.2E-04	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	121-14-2	2,4-Dinitrotoluene	7.1E-08 J	1.1E-06	µg/m^3	YS24-SS17-0410	4/72	N/A	1.1E-06	N/A	2.7E-02 C	N/A	N/A	NO	BSL
	606-20-2	2,6-Dinitrotoluene	3.7E-07	5.4E-07	µg/m^3	A06SB05-05	2/72	N/A	5.4E-07	N/A	N/A	N/A	N/A	NO	NTX
	91-58-7	2-Chloronaphthalene	5.8E-04 J	5.8E-04 J	µg/m^3	YS24-SS11-0410	1/72	N/A	5.8E-04	N/A	N/A	N/A	N/A	NO	NTX
	106-47-8	4-Chloroaniline	1.3E-07 J	1.3E-07 J	µg/m^3	A06SS11-00	1/72	N/A	1.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	208-96-8	Acenaphthylene	1.9E-08 J	1.9E-08 J	µg/m^3	YS24-SS31-0410	1/72	N/A	1.9E-08	N/A	N/A	N/A	N/A	NO	NTX
	120-12-7	Anthracene	4.7E-05 J	4.7E-05 J	µg/m^3	YS24-SS31-0410	1/72	N/A	4.7E-05	N/A	N/A	N/A	N/A	NO	NTX
	100-52-7	Benzaldehyde	9.1E-04 J	9.1E-04 J	µg/m^3	YS24-SS02-0410	1/42	N/A	9.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	2.4E-08 J	1.2E-07 J	µg/m^3	YS24-SS31-0410	12/72	N/A	1.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	1.6E-08 J	1.3E-07 J	µg/m^3	YS24-SB04-0_5-2-0410 : YS24-SS31-0410	13/72	N/A	1.3E-07	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.7E-08 J	2.2E-07	µg/m^3	YS24-SB04-0_5-2-0410	14/72	N/A	2.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.6E-08 J	6.4E-07 J	µg/m^3	A06SS09-00	11/72	N/A	6.4E-07	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	2.3E-08 J	2.2E-07	µg/m^3	YS24-SS31-0410	13/72	N/A	2.2E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.0E-08 J	2.6E-06	µg/m^3	A06SS11-00	27/72	N/A	2.6E-06	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	3.2E-08 J	8.8E-07	µg/m^3	A06SB06-04	4/72	N/A	8.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	2.4E-08 J	1.9E-07	µg/m^3	YS24-SS31-0410	13/72	N/A	1.9E-07	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	3.3E-08 J	3.3E-08 J	µg/m^3	YS24-SB04-0_5-2-0410 : YS24-SS31-0410	2/72	N/A	3.3E-08	N/A	8.0E-04 C	N/A	N/A	NO	BSL
	84-74-2	Di-n-butylphthalate	1.8E-08 J	3.4E-06	µg/m^3	A06SS12-00D	26/72	N/A	3.4E-06	N/A	N/A	N/A	N/A	NO	NTX
	117-84-0	Di-n-octylphthalate	7.2E-08 J	3.3E-07	µg/m^3	YS24-SS01P-0410	2/72	N/A	3.3E-07	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	1.7E-08 J	1.8E-07	µg/m^3	YS24-SS31-0410	20/72	N/A	1.8E-07	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	4.6E-08 J	1.1E-07 J	µg/m^3	YS24-SB04-0_5-2-0410 : YS24-SS31-0410	3/72	N/A	1.1E-07	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	85-01-8	Phenanthrene	1.8E-08 J	6.5E-08 J	µg/m^3	YS24-SS08-0410	16/72	N/A	6.5E-08	N/A	N/A	N/A	N/A	NO	NTX
	129-00-0	Pyrene	9.2E-06 J	9.8E-05	µg/m^3	YS24-SS31-0410	19/72	N/A	9.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	72-54-8	4,4'-DDD	3.1E-10 L	2.6E-08	µg/m^3	A06SS11-00	6/72	N/A	2.6E-08	N/A	3.5E-02 C	N/A	N/A	NO	BSL

Table 2.14
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

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
	72-55-9	4,4'-DDE	1.9E-10 J	8.1E-09 J	µg/m^3	A06SS11-00	16/72	N/A	8.1E-09	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	4.2E-10 J	2.1E-08	µg/m^3	A06SS11-00	17/72	N/A	2.1E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	309-00-2	Aldrin	1.9E-10 J	3.5E-10 J	µg/m^3	YS24-SS07-0410	4/71	N/A	3.5E-10	N/A	5.0E-04 C	N/A	N/A	NO	BSL
	319-84-6	alpha-BHC	1.6E-10 J	1.4E-09 L	µg/m^3	A06SB05-01	4/72	N/A	1.4E-09	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	1.3E-10 J	5.4E-08 J	µg/m^3	A06SS11-00	18/71	N/A	5.4E-08	N/A	N/A	N/A	N/A	NO	NTX
	319-85-7	beta-BHC	5.7E-10 J	4.0E-09	µg/m^3	A06SB05-05	7/72	N/A	4.0E-09	N/A	4.6E-03 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	1.4E-10 J	7.1E-10 J	µg/m^3	YS24-SS25-0410	10/71	N/A	7.1E-10	N/A	N/A	N/A	N/A	NO	NTX
	60-57-1	Dieldrin	1.7E-10 J	4.9E-09 J	µg/m^3	A06SS11-00	6/72	N/A	4.9E-09	N/A	5.3E-04 C	N/A	N/A	NO	BSL
	959-98-8	Endosulfan I	1.5E-10 J	1.1E-09 J	µg/m^3	A06SB05-05D	7/71	N/A	1.1E-09	N/A	N/A	N/A	N/A	NO	NTX
	33213-65-9	Endosulfan II	3.1E-10 J	3.8E-10 L	µg/m^3	YS24-SS02-0410	2/71	N/A	3.8E-10	N/A	N/A	N/A	N/A	NO	NTX
	1031-07-8	Endosulfan sulfate	2.8E-10 J	1.1E-09 J	µg/m^3	YS24-SS02-0410	3/71	N/A	1.1E-09	N/A	N/A	N/A	N/A	NO	NTX
	72-20-8	Endrin	2.8E-10 J	4.1E-10 J	µg/m^3	YS24-SS25-0410	4/71	N/A	4.1E-10	N/A	N/A	N/A	N/A	NO	NTX
	7421-93-4	Endrin aldehyde	2.7E-10 L	8.8E-10 J	µg/m^3	YS24-SS31-0410	15/71	N/A	8.8E-10	N/A	N/A	N/A	N/A	NO	NTX
	53494-70-5	Endrin ketone	3.2E-10 J	1.0E-09 J	µg/m^3	YS24-SS02-0410	4/71	N/A	1.0E-09	N/A	N/A	N/A	N/A	NO	NTX
	58-89-9	gamma-BHC (Lindane)	2.1E-10 J	8.1E-10 J	µg/m^3	YS24-SS18-0410	7/71	N/A	8.1E-10	N/A	7.8E-03 C	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	1.8E-10 J	5.6E-08	µg/m^3	A06SS11-00	19/71	N/A	5.6E-08	N/A	N/A	N/A	N/A	NO	NTX
	76-44-8	Heptachlor	1.5E-10 J	6.9E-10 L	µg/m^3	YS24-SS11P-0410	6/71	N/A	6.9E-10	N/A	1.9E-03 C	N/A	N/A	NO	BSL
	1024-57-3	Heptachlor epoxide	1.3E-10 J	3.6E-10 L	µg/m^3	YS24-SS02-0410	3/71	N/A	3.6E-10	N/A	9.4E-04 C	N/A	N/A	NO	BSL
	72-43-5	Methoxychlor	3.5E-09 J	3.5E-09 J	µg/m^3	YS24-SS02-0410	1/71	N/A	3.5E-09	N/A	N/A	N/A	N/A	NO	NTX
	99-35-4	1,3,5-Trinitrobenzene	4.9E-07	8.8E-07	µg/m^3	A06SB05-05	2/67	N/A	8.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	118-96-7	2,4,6-Trinitrotoluene	8.8E-07	2.5E-06	µg/m^3	A06SB05-05	2/67	N/A	2.5E-06	N/A	N/A	N/A	N/A	NO	NTX
	19406-51-0	4-Amino-2,6-dinitrotoluene	2.7E-07	2.7E-07	µg/m^3	A06SB05-05	1/67	N/A	2.7E-07	N/A	N/A	N/A	N/A	NO	NTX
	7429-90-5	Aluminum	1.3E-03	9.1E-03	µg/m^3	YS24-SB11-5-6-0410 : YS24-SB13-5-6-0410	72/72	N/A	9.1E-03	N/A	5.2E-01 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	2.4E-07 J	3.4E-06 L	µg/m^3	A06SB05-06	23/66	N/A	3.4E-06	N/A	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	4.6E-07 J	1.1E-04	µg/m^3	YS24-SS31-0410	54/72	N/A	1.1E-04	N/A	5.7E-04 C*	N/A	N/A	NO	BSL
	7440-39-3	Barium	7.6E-06	8.3E-05	µg/m^3	YS24-SS12-0410	72/72	N/A	8.3E-05	N/A	5.2E-04 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	5.1E-08 K	1.8E-06	µg/m^3	YS24-SS12-0410	53/72	N/A	1.8E-06	N/A	1.0E-03 C*	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	2.9E-08 J	3.2E-06	µg/m^3	A06SS17-00	40/72	N/A	3.2E-06	N/A	N/A	N/A	N/A	NO	NTX
	7440-70-2	Calcium	8.6E-05	1.6E-01	µg/m^3	YS24-SB08-0_5-2-0410	72/72	N/A	1.6E-01	N/A	N/A	N/A	N/A	NO	NUT
	7440-47-3	**Chromium**	**1.8E-06**	**3.2E-05**	µg/m^3	**YS24-SB11-5-6-0410**	**72/72**	**N/A**	**3.2E-05**	**N/A**	**1.1E-05 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	2.8E-07 J	9.0E-06	µg/m^3	A06SB05-06	72/72	N/A	9.0E-06	N/A	2.7E-04 C*	N/A	N/A	NO	BSL
	7440-50-8	Copper	8.8E-07	1.0E-04	µg/m^3	A06SS11-00	67/72	N/A	1.0E-04	N/A	N/A	N/A	N/A	NO	NTX
	57-12-5	Cyanide	1.0E-07 L	2.6E-06 L	µg/m^3	A06SB06-04D	5/72	N/A	2.6E-06	N/A	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	1.1E-03	2.6E-02	µg/m^3	A06SB05-06	72/72	N/A	2.6E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	2.4E-06	3.4E-05	µg/m^3	YS24-SS17-0410	72/72	N/A	3.4E-05	N/A	N/A	N/A	N/A	NO	NTX
	7439-95-4	Magnesium	9.8E-05	2.1E-03	µg/m^3	YS24-SB08-0_5-2-0410	72/72	N/A	2.1E-03	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	3.5E-06	7.1E-04	µg/m^3	YS24-SS12-0410	72/72	N/A	7.1E-04	N/A	N/A	N/A	N/A	NO	NTX

Table 2.14

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

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
	7439-97-6	Mercury	1.3E-08 J	3.5E-06	$\mu g/m^3$	A06SS11-00	31/72	N/A	3.5E-06	N/A	3.1E-04 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	8.8E-07	2.0E-05	$\mu g/m^3$	A06SB05-06	70/72	N/A	2.0E-05	N/A	9.4E-03 C*	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.1E-04 J	1.8E-03	$\mu g/m^3$	YS24-SB10-5-6-0410	66/72	N/A	1.8E-03	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	4.3E-07 K	5.7E-07 K	$\mu g/m^3$	A06SS12-00	3/72	N/A	5.7E-07	N/A	2.1E-02 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	2.6E-07 J	6.0E-06	$\mu g/m^3$	A06SS11-00	5/72	N/A	6.0E-06	N/A	N/A	N/A	N/A	NO	NTX
	7440-23-5	Sodium	1.5E-05	1.5E-03	$\mu g/m^3$	YS24-SB08-0_5-2-0410	67/72	N/A	1.5E-03	N/A	N/A	N/A	N/A	NO	NUT
	7440-62-2	Vanadium	2.7E-06	7.3E-05	$\mu g/m^3$	A06SB06-04	72/72	N/A	7.3E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-66-6	Zinc	3.6E-06 J	5.6E-05 J	$\mu g/m^3$	A06SB05-06	72/72	N/A	5.6E-05	N/A	N/A	N/A	N/A	NO	NTX

* Surface soil & subsurface soil combined

[1] Minimum/Maximum calculated air concentrations from soil concentrations. Air concentrations calculated as Cair = Csoil*1000*(1/PEF+1/VF)
VF calculated for volatile and semi-volatile analytes identified as volatile in the Regional Screening Levels for Chemical Contaminants at Superfund Sites (Oak Ridge National Laboratory, June 2011). VF calculated on Table 2 Supplement. PEF = 1.36×10^9 m^3/kg.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential Air.
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10).
RSL value for Chromium(VI) used as surrogate for chromium.
RSL value for Manganese (non-diet) used as surrogate for manganese.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Chemical from same class (carcinogenic PAH) identified as a COPC (CPAH)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
S - Concentration exceeds Csat, used Csat as screening value
SSL = Soil Screening Level for Protection of Groundwater, from RSL Table
MG/KG = millograms per kilogram
N/A = Not applicable

Table 2.15

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

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 [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Cornwalis Cave Shallow Aquifer - Tap Water and Water in Excavation Pit	75-15-0	Carbon disulfide	3.1E-02 J	2.0E-01 J	UG/L	YS24-GW04S-0610	3/8	0.5 - 0.5	2.0E-01	N/A	1.0E+02 N			NO	BSL
	67-66-3	Chloroform	8.7E-02 J	8.7E-02 J	UG/L	YS24-GW06S-0610	1/8	0.5 - 0.5	8.7E-02	N/A	1.9E-01 C	8.0E+01	MCL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	1.0E+00	1.0E+00	UG/L	YS24-GW03S-0610 : YS24-GW03SP-0610	1/8	0.5 - 0.5	1.0E+00	N/A	1.3E+02 N			NO	BSL
	60-57-1	Dieldrin	3.8E-03 J	4.1E-03 J	UG/L	YS24-GW10S-0610	2/8	0.1 - 0.1	4.1E-03	N/A	4.2E-03 C			NO	BSL
	959-98-8	Endosulfan I	5.6E-03 J	2.6E-02 J	UG/L	YS24-GW06S-0610	2/8	0.05 - 0.05	2.6E-02	N/A	2.2E+01 N			NO	BSL
	33213-65-9	Endosulfan II	4.6E-03 J	4.6E-03 J	UG/L	YS24-GW10S-0610	1/8	0.1 - 0.1	4.6E-03	N/A	2.2E+01 N			NO	BSL
	72-20-8	Endrin	5.7E-03 J	6.6E-03 J	UG/L	YS24-GW10S-0610	2/8	0.1 - 0.1	6.6E-03	N/A	1.1E+00 N	2.0E+00	MCL	NO	BSL
	5103-74-2	gamma-Chlordane	6.1E-03 J	6.1E-03 J	UG/L	YS24-GW06S-0610	1/8	0.05 - 0.05	6.1E-03	N/A	1.9E-01 C*			NO	BSL
	1024-57-3	**Heptachlor epoxide**	**6.0E-03 J**	**2.8E-02 J**	**UG/L**	**YS24-GW04S-0610**	**3/8**	**0.05 - 0.05**	**2.8E-02**	**N/A**	**7.4E-03 C***	**2.0E-01**	**MCL**	**YES**	**ASL**
	72-43-5	Methoxychlor	3.6E-02 J	3.6E-02 J	UG/L	YS24-GW06S-0610	1/8	0.5 - 0.5	3.6E-02	N/A	1.8E+01 N	4.0E+01	MCL	NO	BSL
	99-35-4	1,3,5-Trinitrobenzene	1.2E+00 J	1.2E+00 J	UG/L	YS24-GW06S-0610	1/8	2.5 - 2.5	1.2E+00	N/A	1.1E+02 N			NO	BSL
	118-96-7	2,4,6-Trinitrotoluene	1.3E+00 J	1.7E+00 J	UG/L	YS24-GW06S-0610	2/8	2.5 - 2.5	1.7E+00	N/A	1.8E+00 C**			NO	BSL
	19406-51-0	4-Amino-2,6-dinitrotoluene	7.8E-01 J	7.8E-01 J	UG/L	YS24-GW06S-0610	1/8	5 - 5	7.8E-01	N/A	7.3E+00 N			NO	BSL
	121-82-4	**RDX**	**1.8E+00 J**	**1.8E+00 J**	**UG/L**	**YS24-GW05S-0610**	**1/8**	**4 - 4**	**1.8E+00**	**N/A**	**6.1E-01 C**			**YES**	**ASL**
	7440-39-3	Barium	1.6E+01 J	2.1E+01 J	UG/L	YS24-GW08S-0610	6/8	200 - 200	2.1E+01	N/A	7.3E+02 N	2.0E+03	MCL	NO	BSL
	7440-70-2	Calcium	8.5E+04	1.3E+05	UG/L	YS24-GW03S-0610	8/8	5000 - 5000	1.3E+05	1.6E+05	N/A			NO	NUT
	57-12-5	Cyanide	4.5E+00 J	5.4E+00 J	UG/L	YS24-GW05S-0610	2/8	10 - 10	5.4E+00	N/A	7.3E+01 N	2.0E+02	MCL	NO	BSL
	7439-89-6	Iron	1.7E+01 J	1.8E+02	UG/L	YS24-GW08S-0610	2/8	100 - 100	1.8E+02	3.6E+03	2.6E+03 N	3.0E+02	2MCL	NO	BSL
	7439-95-4	Magnesium	1.5E+03 J	4.0E+03 J	UG/L	YS24-GW05S-0610	8/8	5000 - 5000	4.0E+03	3.6E+03	N/A			NO	NUT
	7439-96-5	Manganese	4.9E+00 J	2.8E+01	UG/L	YS24-GW10S-0610	3/8	10 - 10	2.8E+01	N/A	8.8E+01 N			NO	BSL
	7440-09-7	Potassium	2.9E+02 J	1.8E+03 J	UG/L	YS24-GW05S-0610	6/8	5000 - 5000	1.8E+03	3.5E+03	N/A			NO	NUT
	7440-23-5	Sodium	3.7E+03 J	8.3E+03	UG/L	YS24-GW05S-0610	5/8	5000 - 5000	8.3E+03	9.9E+03	N/A			NO	NUT

[1] Minimum/Maximum detected concentration. Unfiltered results for metals since in general no significant difference between filtered and unfiltered results and construciton worker would be expected to directly contact unfiltered groundwater in an excavation pit.

[2] Maximum concentration is used for screening.

[3] Background values from Cornwalis Cave background samples; values represent the > 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (n RSLs adjusted by dividing by 10) tap water RSLs.
RSL value for technical chlordane used as surrogate for gamma-chlordane.
RSL value for Manganese (water) used as surrogate for manganese.
RSL value for endosulfan used as surrogate for endosulfan I and endosulfan II.

[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
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards (USEPA, 2009)
2MCL = Secondary MCL (USEPA, 2009)
N/A = Not applicable
UG/L = micrograms per liter
C* = C screening value used as screening level
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level

Table 2.16

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

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
Cornwalis Cave Shallow Aquifer - Water Vapors at Showerhead and Excavation Pit	75-15-0	Carbon disulfide	3.1E-02 J	2.0E-01 J	UG/L	YS24-GW04S-0610	3/8	0.5 - 0.5	2.0E-01	N/A	1.0E+02 N			NO	BSL
	67-66-3	Chloroform	8.7E-02 J	8.7E-02 J	UG/L	YS24-GW06S-0610	1/8	0.5 - 0.5	8.7E-02	N/A	1.9E-01 C	8.0E+01	MCL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	1.0E+00	1.0E+00	UG/L	YS24-GW03S-0610 : YS24-GW03SP-0610	1/8	0.5 - 0.5	1.0E+00	N/A	1.3E+02 N			NO	BSL

[1] Minimum/Maximum detected concentration.

[2] Maximum concentration is used for screening.

[3] Background values from Cornwalis Cave background samples; values represent the > 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). June 20110. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (n RSLs adjusted by dividing by 10) tap water RSLs.

[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

J = Estimated Value

C = Carcinogenic

N = Noncarcinogenic

MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards (USEPA, 2009)

UG/L = micrograms per liter

N/A = Not applicable

Table 2.17

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

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
Cornwalis Cave	75-15-0	Carbon disulfide	3.1E-02 J	2.0E-01 J	UG/L	YS24-GW04S-0610	3/8	0.5 - 0.5	2.0E-01	N/A	1.5E+02 N	N/A		NO	BSL
Shallow Aquifer -	67-66-3	Chloroform	8.7E-02 J	8.7E-02 J	UG/L	YS24-GW06S-0610	1/8	0.5 - 0.5	8.7E-02	N/A	8.0E+01 C	8.0E+01	MCL	NO	BSL
Vapor Intrusion to Indoor Air	75-69-4	Trichlorofluoromethane (Freo	1.0E+00	1.0E+00	UG/L	03S-0610 : YS24-GW0	1/8	0.5 - 0.5	1.0E+00	N/A	2.3E+01 N	N /A		NO	BSL

[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values not available.
[4] Generic vapor intrusion screening values (USEPA, 2002); see Table 2.13 Supplement A
[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
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
µg/L = microgram per liter
MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards
N/A = Not applicable

Table 2.17 Supplement A
Calculation of Target Groundwater Concentrations for Vapor Intrusion Screening[1]
Site 24, NWS Yorktown, Yorktown, Virginia

CAS Number	Chemical	Unit Risk Factor (URF) $(\mu g/m^3)^{-1}$	Reference Concentration (RfC) mg/m^3	Target Indoor Air Concentration[2], carcinogen (C_{Cancer}) $\mu g/m^3$	Target Indoor Air Concentration[2], non-carcinogen ($C_{non\text{-}Cancer}$) $\mu g/m^3$	Target Indoor Air Concentration ($C_{target,ia}$) $\mu g/m^3$	System Temperature Henry's Law Constant (H'TS)[3] Dimensionless	Risk-Based Target Groundwater Concentration (C_{gw}) µg/L	MCL µg/L	Final Target Groundwater Concentration[4] (C_{gw}) µg/L
75-15-0	Carbon disulfide	N/A	7.0E-01	N/A	7.3E+01	7.3E+01	4.7E-01	1.5E+02	N/A	1.5E+02
67-66-3	Chloroform	2.3E-05	9.8E-02	1.1E-01	1.0E+01	1.1E-01	1.2E-01	9.1E-01	8.0E+01	8.0E+01
75-69-4	Trichlorofluoromethane (Freon-11)	N/A	7.0E-01	N/A	7.3E+01	7.3E+01	3.1E+00	2.3E+01	N/A	2.3E+01

Notes:
[1] The vapor intrusion screening levels [i.e., target groundwater concentration from Table 2c, Subsurface Vapor Intrusion Guidance (USEPA, 2002)] were updated using the methodology presented in Appendix D of Subsurface Vapor Intrusion Guidance (EPA, 2002).
[2] Values are Regional Screening Levels (RSLs) for residential air (based on 10-6 for carcinogens and HQ of 0.1 for noncarcinogens). [Oak Ridge National Laboratory (ORNL), June 2011].
[3] H'TS = Henry's Law Constant (dimensionless) at system (i.e., groundwater) temperature.
[4] If the calculated groundwater target concentration is less than the Maximum Contaminant Level (MCL) for the compound, the target concentration is set at the MCL (USEPA, 2002)
MCL = maximum contaminant level (USEPA, 2009).
N/A = Not available.

Variables	Units	Value
$C_{target,ia}$ = Target indoor air conc., minimum	ug/m^3	Solved by Eq. 1
C_{gw} = Target groundwater conc.	ug/L	Solved by Eq. 2
TCR = Target Cancer Risk	unitless	1.00E-06
THQ = Target Hazard Quotient	unitless	1
URF = Unit Risk Factor	$(ug/m^3)^{-1}$	Chemical-specific
RfC = Reference Concentration	mg/m^3	Chemical-specific
H'TS = Dimensionless Henry's Law Constant	unitless	Chemical-specific
alpha (α) = Attenuation Factor	unitless	0.001

Equation 1: $C_{target,ia}$ = Minimum(C_{cancer}, $C_{non\text{-}cancer}$)

Equation 2: Cgw = $C_{target,ia} \times 10^{-3}\ m^3/L * 1/H'TS * 1/\alpha$

Table 2.18

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

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 [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Yorktown-Eastover Deep Aquifer Tap Water	71-43-2	Benzene	8.0E-02 J	8.0E-02 J	UG/L	YS24-GW02D-0610	1/2	0.5 - 0.5	8.0E-02	N/A	4.1E-01 C	5.0E+00	MCL	NO	BSL
	75-15-0	Carbon disulfide	1.7E-01 J	1.7E-01 J	UG/L	YS24-GW01D-0610	1/2	0.5 - 0.5	1.7E-01	N/A	1.0E+02 N	N/A		NO	BSL
	67-66-3	Chloroform	8.6E-02 J	1.8E-01 J	UG/L	YS24-GW01D-0610	2/2	0.5 - 0.5	1.8E-01	N/A	1.9E-01 C	8.0E+01	MCL	NO	BSL
	100-41-4	Ethylbenzene	5.7E-02 J	8.3E-02 J	UG/L	YS24-GW02D-0610	2/2	0.5 - 0.5	8.3E-02	N/A	1.5E+00 C	7.0E+02	MCL	NO	BSL
	m&pXYLENE	m- and p-Xylene	1.3E-01 J	1.3E-01 J	UG/L	YS24-GW02D-0610	1/2	1 - 1	1.3E-01	N/A	2.0E+01 N	N/A		NO	BSL
	95-47-6	o-Xylene	3.8E-02 J	6.0E-02 J	UG/L	YS24-GW02D-0610	2/2	0.5 - 0.5	6.0E-02	N/A	2.0E+01 N	N/A		NO	BSL
	100-42-5	Styrene	2.1E-02 J	2.1E-02 J	UG/L	YS24-GW01D-0610	1/2	0.5 - 0.5	2.1E-02	N/A	1.6E+02 N	1.0E+02	MCL	NO	BSL
	108-88-3	Toluene	3.7E+00	3.7E+00	UG/L	YS24-GW02D-0610	1/2	0.5 - 0.5	3.7E+00	N/A	2.3E+02 N	1.0E+03	MCL	NO	BSL
	1330-20-7	Xylene, total	3.8E-02 J	2.1E-01 J	UG/L	YS24-GW02D-0610	2/2	0.5 - 0.5	2.1E-01	N/A	2.0E+01 N	1.0E+04	MCL	NO	BSL
	91-57-6	2-Methylnaphthalene	1.7E-02 J	1.7E-02 J	UG/L	YS24-GW02D-0610	1/2	0.2 - 0.2	1.7E-02	N/A	1.5E+01 N	N/A		NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.6E+00 J	1.6E+00 J	UG/L	YS24-GW02D-0610	1/2	5 - 5	1.6E+00	N/A	4.8E+00 C	6.0E+00	MCL	NO	BSL
	117-84-0	Di-n-octylphthalate	7.1E+00	7.1E+00	UG/L	YS24-GW01D-0610	1/2	5 - 5	7.1E+00	N/A	3.7E+02 N	N/A		NO	BSL
	319-85-7	beta-BHC	1.8E-02 J	1.8E-02 J	UG/L	YS24-GW02D-0610	1/2	0.05 - 0.05	1.8E-02	N/A	3.7E-02 C	N/A		NO	BSL
	959-98-8	Endosulfan I	8.4E-02 J	8.4E-02 J	UG/L	YS24-GW02D-0610	1/2	0.05 - 0.05	8.4E-02	N/A	2.2E+01 N	N/A		NO	BSL
	1024-57-3	**Heptachlor epoxide**	**9.8E-03 J**	**9.8E-03 J**	**UG/L**	**YS24-GW02D-0610**	**1/2**	**0.05 - 0.05**	**9.8E-03**	**N/A**	**7.4E-03 C***	**2.0E-01**	**MCL**	**YES**	**ASL**
	7440-39-3	Barium	2.9E+01 J	3.5E+01 J	UG/L	YS24-GW01D-0610	2/2	200 - 200	3.5E+01	N/A	7.3E+02 N	2.0E+03	MCL	NO	BSL
	7440-70-2	Calcium	2.5E+04	7.5E+04	UG/L	YS24-GW01D-0610	2/2	5000 - 5000	7.5E+04	1.7E+05	N/A	N/A		NO	NUT
	7439-89-6	Iron	2.4E+02	5.4E+02	UG/L	YS24-GW01D-0610	2/2	100 - 100	5.4E+02	8.9E+02	2.6E+03 N	3.0E+02	2MCL	NO	BSL
	7439-95-4	Magnesium	1.5E+03 J	2.5E+03 J	UG/L	YS24-GW01D-0610	2/2	5000 - 5000	2.5E+03	1.2E+04	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**1.8E+01**	**1.1E+02**	**UG/L**	**YS24-GW01D-0610**	**2/2**	**10 - 10**	**1.1E+02**	**N/A**	**8.8E+01 N**	**N/A**		**YES**	**ASL**
	7440-09-7	Potassium	9.9E+03	2.8E+04	UG/L	YS24-GW02D-0610	2/2	5000 - 5000	2.8E+04	1.3E+04	N/A	N/A		NO	NUT
	7440-23-5	Sodium	3.7E+04	9.0E+04	UG/L	YS24-GW02D-0610	2/2	5000 - 5000	9.0E+04	6.5E+04	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	4.5E+00 J	4.5E+00 J	UG/L	YS24-GW02D-0610	1/2	20 - 20	4.5E+00	N/A	1.8E+01 N	N/A		NO	BSL
	7440-66-6	Zinc	4.3E+00 J	4.3E+00 J	UG/L	YS24-GW02D-0610	1/2	20 - 20	4.3E+00	N/A	1.1E+03 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentration. Unfiltered results for metals since in general no significant difference between filtered and unfiltered results.

[2] Maximum concentration is used for screening.

[3] Background values from Yorktown-Eastover background samples; values represent the > 95% UTL.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (n RSLs adjusted by dividing by 10) tap water RSLs.

RSL value for dibutyl phthalate used as surrogate for di-n-octylphthalate.

RSL value for Manganese (water) used as surrogate for manganese.

RSL value for endosulfan used as surrogate for endosulfan I.

[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
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
C* = C screening value used as screening level
N = Noncarcinogenic
MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards (USEPA, 2009)
2MCL = Secondary MCL (USEPA, 2009)
UG/L = micrograms per liter
N/A = Not applicable

Table 2.19

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

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
Yorktown-Eastover Deep Aquifer Water Vapors at Showerhead	71-43-2	Benzene	8.0E-02 J	8.0E-02 J	UG/L	YS24-GW02D-0610	1/2	0.5 - 0.5	8.0E-02	N/A	4.1E-01 C	5.0E+00	MCL	NO	BSL
	75-15-0	Carbon disulfide	1.7E-01 J	1.7E-01 J	UG/L	YS24-GW01D-0610	1/2	0.5 - 0.5	1.7E-01	N/A	1.0E+02 N	N/A		NO	BSL
	67-66-3	Chloroform	8.6E-02 J	1.8E-01 J	UG/L	YS24-GW01D-0610	2/2	0.5 - 0.5	1.8E-01	N/A	1.9E-01 C	8.0E+01	MCL	NO	BSL
	100-41-4	Ethylbenzene	5.7E-02 J	8.3E-02 J	UG/L	YS24-GW02D-0610	2/2	0.5 - 0.5	8.3E-02	N/A	1.5E+00 C	7.0E+02	MCL	NO	BSL
	m&pXYLENE	m- and p-Xylene	1.3E-01 J	1.3E-01 J	UG/L	YS24-GW02D-0610	1/2	1 - 1	1.3E-01	N/A	2.0E+01 N	N/A		NO	BSL
	95-47-6	o-Xylene	3.8E-02 J	6.0E-02 J	UG/L	YS24-GW02D-0610	2/2	0.5 - 0.5	6.0E-02	N/A	2.0E+01 N	N/A		NO	BSL
	100-42-5	Styrene	2.1E-02 J	2.1E-02 J	UG/L	YS24-GW01D-0610	1/2	0.5 - 0.5	2.1E-02	N/A	1.6E+02 N	1.0E+02	MCL	NO	BSL
	108-88-3	Toluene	3.7E+00	3.7E+00	UG/L	YS24-GW02D-0610	1/2	0.5 - 0.5	3.7E+00	N/A	2.3E+02 N	1.0E+03	MCL	NO	BSL
	1330-20-7	Xylene, total	3.8E-02 J	2.1E-01 J	UG/L	YS24-GW02D-0610	2/2	0.5 - 0.5	2.1E-01	N/A	2.0E+01 N	1.0E+04	MCL	NO	BSL
	91-57-6	2-Methylnaphthalene	1.7E-02 J	1.7E-02 J	UG/L	YS24-GW02D-0610	1/2	0.2 - 0.2	1.7E-02	N/A	1.5E+01 N	N/A		NO	BSL

[1] Minimum/Maximum detected concentration.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml. Adjusted (n RSLs adjusted by dividing by 10) tap water RSLs.

[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

J = Estimated Value

C = Carcinogenic

N = Noncarcinogenic

MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards (USEPA, 2009)

Table 3.1

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Surface Soil in Waste Area	Benzo(a)pyrene	MG/KG	NA	NA		4.0E-02	J	4.0E-02	MG/KG	Max	6
	Benzo(b)fluoranthene	MG/KG	NA	NA		3.8E-02	J	3.8E-02	MG/KG	Max	6
	Benzo(k)fluoranthene	MG/KG	NA	NA		2.9E-02	J	2.9E-02	MG/KG	Max	6
	Aroclor-1254	MG/KG	NA	NA		5.9E-01		5.9E-01	MG/KG	Max	6
	Aluminum	MG/KG	7.5E+03	9.1E+03	N	1.2E+04		9.1E+03	MG/KG	95% Stud-t	1, 2, 3
	Arsenic	MG/KG	2.3E+00	3.2E+00	NP	5.6E+00		3.2E+00	MG/KG	95% KM-t	1, 2, 3
	Cadmium	MG/KG	8.8E+01	1.0E+03	NP	7.9E+02		7.9E+02	MG/KG	Max	4, 5
	Chromium	MG/KG	1.0E+01	1.3E+01	N	2.1E+01		1.3E+01	MG/KG	95% Stud-t	1, 2, 3
	Cobalt	MG/KG	2.4E+00	3.4E+00	N	6.0E+00		3.4E+00	MG/KG	95% Stud-t	1, 2, 3
	Iron	MG/KG	5.8E+03	7.5E+03	N	1.1E+04		7.5E+03	MG/KG	95% Stud-t	1, 2, 3

Notes:

ProUCL, Version 4.00.05 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Student's-T test UCL (95% Stud-t); Maximum Detected Value (Max)

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) Test indicates data are gamma distributed.

(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

(5) Maximum value used because calculated UCL exceeds maximum concentration.

(6) Maximum detected concentration used because constituent detected in only one sample.

J - Estimated Value
MG/KG - milligrams per kilogram
N - Normal
NP - Non-Parametric
NA = Not Applicable

Table 3.2

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)	Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Emissions From Surface Soil in Waste Area	Chromium	mg/m^3	7.5E-09	9.7E-09	N	1.5E-08	9.7E-09	mg/m^3	95% Stud-t	1, 2, 3

Notes:

ProUCL, Version 4.00.05 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. Prepared by Lockheed Martin Environmental Services).

Options: 95% Student's-T test UCL (95% Stud-t)

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) Test indicates data are gamma distributed.

J - Estimated Value

mg/m^3 = milligrams per cubic meter

N - Normal

Table 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Surface Soil Across Site	Benzo(a)anthracene	MG/KG	5.8E-02	7.8E-02	NP	1.6E-01	J	7.8E-02	MG/KG	95% KM-t	1, 3
	Benzo(a)pyrene	MG/KG	6.7E-02	8.9E-02	NP	1.8E-01	J	8.9E-02	MG/KG	95% KM-t	1, 3
	Benzo(b)fluoranthene	MG/KG	7.0E-02	9.1E-02	NP	2.5E-01		9.1E-02	MG/KG	95% KM-t	1, 3
	Benzo(k)fluoranthene	MG/KG	7.0E-02	8.9E-02	NP	3.0E-01		8.9E-02	MG/KG	95% KM-t	1, 3
	Chrysene	MG/KG	2.4E-01	3.1E-01	NP	2.6E-01		2.6E-01	MG/KG	Max	4, 5
	Dibenz(a,h)anthracene	MG/KG	NA	NA		4.5E-02	J	4.5E-02	MG/KG	Max	6
	Indeno(1,2,3-cd)pyrene	MG/KG	1.1E-01	1.8E-01	NP	1.5E-01	J	1.5E-01	MG/KG	Max	4, 5
	Aroclor-1254	MG/KG	NA	NA		5.9E-01		5.9E-01	MG/KG	Max	6
	Aluminum	MG/KG	6.4E+03	6.9E+03	N	1.2E+04		6.9E+03	MG/KG	95% Stud-t	1, 2, 3
	Arsenic	MG/KG	6.4E+00	2.1E+01	NP	1.5E+02		2.1E+01	MG/KG	95% KM	4
	Cadmium	MG/KG	1.6E+01	1.1E+02	NP	7.9E+02		1.1E+02	MG/KG	97.5% KM	4
	Chromium	MG/KG	9.0E+00	1.0E+01	T	2.5E+01	J	1.0E+01	MG/KG	95% H-UCL	1
	Cobalt	MG/KG	2.2E+00	2.6E+00	G	9.0E+00		2.6E+00	MG/KG	App-G	1, 3
	Iron	MG/KG	5.7E+03	6.7E+03	T	1.8E+04		6.7E+03	MG/KG	95% H-UCL	1
	Manganese	MG/KG	8.7E+01	1.0E+02	T	9.6E+02		1.0E+02	MG/KG	95% H-UCL	1
	Mercury	MG/KG	1.7E-01	5.9E-01	NP	4.7E+00		5.9E-01	MG/KG	95% KM	4

Notes:
ProUCL, Version 4.00.05 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Student's-T test UCL (95% Stud-t); 95% Kaplan-Meier Chebyshev UCL (95% KM); 97.5% Kaplan-Meier Chebyshev UCL (97.5% KM); 95% H-Stat UCL (95% H-UCL); 95% Approximate Gamma UCL (App-G); Maximum Detected Value (Max)

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) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum value used because calculated UCL exceeds maximum concentration.
(6) Maximum detected concentration used because constituent detected in only one sample.

J - Estimated Value
MG/KG - milligrams per kilogram
N - Normal
NP - Non-Parametric
T - Lognormal
NA - Not Applicable

Table 3.4

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Emissions From Surface Soil Across Site	Chromium	mg/m^3	6.6E-09	7.7E-09 T	1.8E-08 J	7.7E-09	mg/m^3	95% H-UCL	1

Notes:

ProUCL, Version 4.00.05 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. Prepared by Lockheed Martin Environmental Services).

Options: 95% H-Stat UCL (95% H-UCL)

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) Test indicates data are gamma distributed.

J - Estimated Value

mg/m^3 = milligrams per cubic meter

T - Lognormal

Table 3.5

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Surface Soil Outside Waste Area	Benzo(a)anthracene	MG/KG	5.8E-02	7.8E-02	NP	1.6E-01	J	7.8E-02	MG/KG	95% KM-t	1, 3
	Benzo(a)pyrene	MG/KG	7.0E-02	9.4E-02	NP	1.8E-01	J	9.4E-02	MG/KG	95% KM-t	1, 3
	Benzo(b)fluoranthene	MG/KG	7.3E-02	9.5E-02	NP	2.5E-01		9.5E-02	MG/KG	95% KM-t	1, 3
	Benzo(k)fluoranthene	MG/KG	7.4E-02	9.4E-02	NP	3.0E-01		9.4E-02	MG/KG	95% KM-t	1, 3
	Chrysene	MG/KG	7.4E-02	9.1E-02	NP	2.6E-01		9.1E-02	MG/KG	95% KM-t	1, 3
	Dibenz(a,h)anthracene	MG/KG	NA	NA		4.5E-02	J	4.5E-02	MG/KG	Max	5
	Indeno(1,2,3-cd)pyrene	MG/KG	1.1E-01	1.8E-01	NP	1.5E-01	J	1.5E-01	MG/KG	Max	4, 5
	Aluminum	MG/KG	6.2E+03	6.7E+03	N	1.2E+04		6.7E+03	MG/KG	95% Stud-t	1, 2, 3
	Arsenic	MG/KG	7.2E+00	2.5E+01	NP	1.5E+02		2.5E+01	MG/KG	95% KM	4
	Chromium	MG/KG	8.8E+00	1.0E+01	T	2.5E+01	J	1.0E+01	MG/KG	95% H-UCL	1
	Cobalt	MG/KG	2.1E+00	2.6E+00	G	9.0E+00		2.6E+00	MG/KG	App-G	1, 3
	Iron	MG/KG	5.6E+03	6.8E+03	T	1.8E+04		6.8E+03	MG/KG	95% H-UCL	1
	Manganese	MG/KG	9.1E+01	1.9E+02	NP	9.6E+02		1.9E+02	MG/KG	95% Cheb-m	4
	Mercury	MG/KG	1.6E-01	6.7E-01	NP	4.7E+00		6.7E-01	MG/KG	95% KM	4

ProUCL, Version 4.1 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. ProUCL, Version 4.1. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Approximate Gamma UCL (App-G); 95% Kaplan-Meier Chebyshev (95% KM); 95% H-Stat UCL (95% H-UCL); 95% Student's-T test UCL (95% Stud-t); 95% Chebyshev (mean, std) UCL (95% Cheb-m); Maximum Detected Value (Max)

Upper Confidence Limit (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) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive
(5) Maximum detected concentration used because constituent detected in only one sample.

NP = Non-Parametric
G = Gamma
MG/KG - milligrams per kilogran
J = Estimated Value
T - Lognormal

Table 3.6
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Emissions From Surface Soil Outside Waste Area	Chromium	mg/m^3	6.5E-09	7.7E-09	T	1.8E-08	J	7.7E-09	mg/m^3	95% H-UCL	1

ProUCL, Version 4.1 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. ProUCL, Version 4.1. Prepared by Lockheed Martin Environmental Services).
Options: 95% H-Stat UCL (95% H-UCL)

UCL Rationale:
(1) Test indicates data are gamma distributed.

mg/m^3 = milligrams per cubic meter
NA = Not Applicable

T - Lognormal
mg/m^3 = milligrams per cubic meter
J = Estimated Value

Table 3.7
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Poin	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Soil* in Sludge Area	Chromium	MG/KG	6.4E+00	NA	6.9E+00	6.9E+00	MG/KG	Max	1
	Cobalt	MG/KG	5.7E+00	NA	8.7E+00	8.7E+00	MG/KG	Max	1
	Iron	MG/KG	5.3E+03	NA	5.8E+03	5.8E+03	MG/KG	Max	1
	Manganese	MG/KG	1.5E+02	NA	2.5E+02	2.5E+02	MG/KG	Max	1

* Surface soil & subsurface soil combined.
Options: Maximum Detected Value (Max)

UCL Rationale:
(1) Maximum detected concentration used because only three soil samples available.

MG/KG - milligrams per kilogram

Table 3.8

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Soil* in Waste Area	2,4-Dinitrotoluene	MG/KG	NA	NA		2.1E+00	J	2.1E+00	MG/KG	Max	6
	Benzo(a)anthracene	MG/KG	NA	NA		4.2E-02	J	4.2E-02	MG/KG	Max	6
	Benzo(a)pyrene	MG/KG	NA	NA		4.0E-02	J	4.0E-02	MG/KG	Max	6
	Benzo(b)fluoranthene	MG/KG	4.7E-02	6.2E-02	NP	5.6E-02	J	5.6E-02	MG/KG	Max	4, 5
	Benzo(k)fluoranthene	MG/KG	3.8E-02	5.2E-02	NP	4.6E-02	J	4.6E-02	MG/KG	Max	4, 5
	Chrysene	MG/KG	NA	NA		5.0E-02	J	5.0E-02	MG/KG	Max	6
	n-Nitroso-di-n-propylamine	MG/KG	NA	NA		9.3E-02	J	9.3E-02	MG/KG	Max	6
	alpha-BHC	MG/KG	2.1E-02	3.1E-01	NP	4.6E-01		3.1E-01	MG/KG	99% KM	4
	Aroclor-1254	MG/KG	4.9E+00	1.2E+01	NP	7.9E+01		1.2E+01	MG/KG	95% KM-t	1, 3
	Aroclor-1260	MG/KG	3.3E-01	7.4E-01	NP	4.9E+00		7.4E-01	MG/KG	95% KM-t	1, 3
	Dieldrin	MG/KG	9.9E-03	4.0E-02	NP	9.0E-02	J	4.0E-02	MG/KG	97.5% KM	1
	Heptachlor	MG/KG	9.7E-03	1.4E-01	NP	2.0E-01		1.4E-01	MG/KG	99% KM	4
	2,4,6-Trinitrotoluene	MG/KG	NA	NA		4.1E+00	J	4.1E+00	MG/KG	Max	6
	Aluminum	MG/KG	2.3E+04	9.0E+04	NP	3.4E+05		9.0E+04	MG/KG	95% Cheb-m	4
	Arsenic	MG/KG	2.3E+00	2.9E+00	NP	5.6E+00		2.9E+00	MG/KG	95% KM-b	1, 3
	Cadmium	MG/KG	7.0E+01	5.0E+02	NP	7.9E+02		5.0E+02	MG/KG	99% KM	1
	Chromium	MG/KG	1.6E+01	2.1E+01	G	6.5E+01		2.1E+01	MG/KG	App-G	1, 3
	Cobalt	MG/KG	2.7E+00	5.2E+00	NP	1.1E+01		5.2E+00	MG/KG	95% KM	1
	Copper	MG/KG	7.4E+02	5.2E+03	NP	1.6E+04		5.2E+03	MG/KG	97.5% Cheb-m	4
	Iron	MG/KG	8.1E+03	1.1E+04	G	2.1E+04		1.1E+04	MG/KG	App-G	3
	Manganese	MG/KG	1.9E+02	7.5E+02	NP	2.9E+03		7.5E+02	MG/KG	95% Cheb-m	4
	Vanadium	MG/KG	1.7E+01	3.4E+01	NP	8.9E+01		3.4E+01	MG/KG	95% Cheb-m	4

Table 3.8

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale

* Surface soil & subsurface soil combined.

Notes:

ProUCL, Version 4.00.05 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Kaplan-MeierChebshev UCL (95% KM); 97.5% Kaplan-Meier Chebyshev UCL (97.5% KM); 95% Chebyshev (mean, std) UCL (95% Cheb-m); 97.5% Chebyshev (mean,std) UCL (97.5% Cheb-m); 95% Approximate Gamma UCL (App-G); 99% Kaplan-Meier Chebyshev UCL (9 97.5% Chebyshev (mean,std) UCL (97.5% Cheb-m); 95% Approximate Gamma UCL (App. Gamma); 99% Kaplan-Meier UCL (99% KM); 95% Kaplan-Meier (bootstrap) UCL (95% KM-b); Maximum Detected Value (Max)

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) Test indicates data are gamma distributed.

(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

(5) Maximum value used because calculated UCL exceeds maximum concentration.

(6) Maximum detected concentration used because constituent detected in only one sample.

J - Estimated Value
MG/KG - milligrams per kilogram
NP - Non-Parametric
G - Gamma
NA = Not Applicable

Table 3.9

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Emissions From Soil* in Waste Area	Chromium	mg/m^3	1.2E-08	1.6E-08 G	4.8E-08	1.6E-08	mg/m^3	95% Stud-t	1, 2, 3

Notes:

ProUCL, Version 4.00.05 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. Prepared by Lockheed Martin Environmental Services).

Options: 95% Student's-T test UCL (95% Stud-t); Maximum Detected Value (Max)

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) Test indicates data are gamma distributed.

(4) Maximum detected concentration used because constituent detected in only one sample.

J - Estimated Value

mg/m^3 = milligrams per cubic meter

G - Gamma

NA = Not Applicable

Table 3.10
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Soil*											
Across Site	2,4-Dinitrotoluene	MG/KG	1.5E-01	2.1E-01	NP	2.1E+00	J	2.1E-01	MG/KG	95% KM-t	1, 2, 3
	Benzo(a)anthracene	MG/KG	5.4E-02	7.0E-02	NP	1.6E-01	J	7.0E-02	MG/KG	95% KM-b	4
	Benzo(a)pyrene	MG/KG	8.8E-02	1.1E-01	NP	1.8E-01	J	1.1E-01	MG/KG	95% KM-t	1, 3
	Benzo(b)fluoranthene	MG/KG	7.2E-02	9.0E-02	NP	3.0E-01		9.0E-02	MG/KG	95% KM-t	1, 3
	Benzo(k)fluoranthene	MG/KG	7.0E-02	8.5E-02	NP	3.0E-01		8.5E-02	MG/KG	95% KM-t	1, 3
	Chrysene	MG/KG	7.3E-02	8.6E-02	NP	2.6E-01		8.6E-02	MG/KG	95% KM-t	1, 3
	Dibenz(a,h)anthracene	MG/KG	NA	NA		4.5E-02	J	4.5E-02	MG/KG	Max	6
	Indeno(1,2,3-cd)pyrene	MG/KG	1.2E-01	1.7E-01	NP	1.5E-01	J	1.5E-01	MG/KG	Max	4, 5
	n-Nitroso-di-n-propylamine	MG/KG	NA	NA		9.3E-02	J	9.3E-02	MG/KG	Max	6
	alpha-BHC	MG/KG	5.3E-03	3.9E-02	NP	4.6E-01		3.9E-02	MG/KG	97.5% KM	4
	Aroclor-1254	MG/KG	1.6E+00	3.2E+00	NP	7.9E+01		3.2E+00	MG/KG	95% KM-t	1, 3
	Aroclor-1260	MG/KG	1.2E-01	2.2E-01	NP	4.9E+00		2.2E-01	MG/KG	95% KM-t	1, 3
	Dieldrin	MG/KG	1.7E-03	3.5E-03	NP	9.0E-02	J	3.5E-03	MG/KG	95% KM-t	1, 3
	Heptachlor	MG/KG	2.5E-03	1.7E-02	NP	2.0E-01		1.7E-02	MG/KG	97.5% KM	4
	2,4,6-Trinitrotoluene	MG/KG	1.3E+00	1.3E+00	NP	4.1E+00	J	1.3E+00	MG/KG	95% KM-t	1, 2
	Aluminum	MG/KG	1.0E+04	2.6E+04	NP	3.4E+05		2.6E+04	MG/KG	95% Cheb-m	4
	Antimony	MG/KG	5.9E-01	6.9E-01	NP	4.6E+00	L	6.9E-01	MG/KG	95% KM-b	4
	Arsenic	MG/KG	7.1E+00	1.7E+01	NP	1.5E+02		1.7E+01	MG/KG	95% KM	4
	Cadmium	MG/KG	1.7E+01	8.1E+01	NP	7.9E+02		8.1E+01	MG/KG	97.5% KM	4
	Chromium	MG/KG	1.3E+01	1.7E+01	NP	6.5E+01		1.7E+01	MG/KG	95% Cheb-m	4
	Cobalt	MG/KG	2.5E+00	2.9E+00	NP	1.2E+01		2.9E+00	MG/KG	95% KM (BCA)	1
	Copper	MG/KG	1.8E+02	9.0E+02	NP	1.6E+04		9.0E+02	MG/KG	95% KM	4
	Iron	MG/KG	8.4E+03	1.2E+04	NP	3.6E+04		1.2E+04	MG/KG	95% Cheb-m	4
	Manganese	MG/KG	1.0E+02	2.4E+02	NP	2.9E+03		2.4E+02	MG/KG	95% Cheb-m	4
	Mercury	MG/KG	1.1E-01	2.1E-01	NP	4.7E+00		2.1E-01	MG/KG	95% KM (BCA)	4
	Vanadium	MG/KG	1.7E+01	1.9E+01	T	9.9E+01		1.9E+01	MG/KG	95% H-UCL	1

Table 3.10

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale

Notes:

ProUCL, Version 4.00.05 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Kaplan-Meier Chebyshev UCL (95% KM); 97.5% Kaplan-Meier Chebyshev UCL (97.5% KM); 95% Chebyshev (mean, std) UCL (95% Cheb-m); 95% H-Stat UCL (95% H-UCL); 95% KM BCA UCL (95% KM-BCA); 95% Kaplan-Meier (bootstrap) UCL (95% KM-b); Maximum Detected Value (Max)

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) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum value used because calculated UCL exceeds maximum concentration.
(6) Maximum detected concentration used because1 detected sample in dataset.

J - Estimated Value
L = Biased Low
MG/KG - milligrams per kilogram
NP - Non-Parametric
T = Lognormal
NA = Not Applicable

Table 3.11

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)	Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Emissions From Soil* Across Site	Chromium	mg/m^3	9.3E-09	1.3E-08	NP	4.8E-08	1.3E-08	mg/m^3	95% Cheb-m	1

Notes:

* Surface soil & subsurface soil combined.

Options: Maximum Detected Value (Max)

UCL Rationale:

(1) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

mg/m^3 = milligrams per cubic meter

NP - Non-Parametric

Table 3.12

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Soil*											
Outside Waste Area	Benzo(a)anthracene	MG/KG	5.5E-02	7.2E-02	NP	1.6E-01	J	7.2E-02	MG/KG	95% KM-t	3
	Benzo(a)pyrene	MG/KG	7.5E-02	9.8E-02	NP	1.8E-01	J	9.8E-02	MG/KG	95% KM-t	1, 3
	Benzo(b)fluoranthene	MG/KG	7.6E-02	9.6E-02	NP	3.0E-01		9.6E-02	MG/KG	95% KM-t	1, 3
	Benzo(k)fluoranthene	MG/KG	7.6E-02	9.3E-02	NP	3.0E-01		9.3E-02	MG/KG	95% KM-t	1, 3
	Chrysene	MG/KG	7.5E-02	8.9E-02	NP	2.6E-01		8.9E-02	MG/KG	95% KM-t	1, 3
	Dibenz(a,h)anthracene	MG/KG	NA	NA		4.5E-02	J	4.5E-02	MG/KG	Max	5
	Indeno(1,2,3-cd)pyrene	MG/KG	1.2E-01	1.7E-01	NP	1.5E-01	J	1.5E-01	MG/KG	Max	4, 6
	Aluminum	MG/KG	6.5E+03	7.0E+03	N	1.2E+04		7.0E+03	MG/KG	95% Stud-t	1, 2, 3
	Antimony	MG/KG	6.3E-01	7.6E-01	NP	4.6E+00	L	7.6E-01	MG/KG	95% KM-b	4
	Arsenic	MG/KG	8.7E+00	2.1E+01	NP	1.5E+02		2.1E+01	MG/KG	95% KM	1
	Chromium	MG/KG	1.2E+01	1.4E+01	T	4.3E+01		1.4E+01	MG/KG	95% H-UCL	1
	Cobalt	MG/KG	2.4E+00	2.8E+00	T	1.2E+01		2.8E+00	MG/KG	95% H-UCL	1
	Iron	MG/KG	8.5E+03	1.0E+04	T	3.6E+04		1.0E+04	MG/KG	95% H-UCL	1
	Manganese	MG/KG	7.5E+01	1.3E+02	NP	9.6E+02		1.3E+02	MG/KG	95% Cheb-m	4
	Mercury	MG/KG	1.1E-01	2.4E-01	NP	4.7E+00		2.4E-01	MG/KG	95% KM-BCA	4
	Vanadium	MG/KG	1.7E+01	1.9E+01	G	9.9E+01		1.9E+01	MG/KG	App-G	1, 3

Notes:

ProUCL, Version 4.1 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. ProUCL, Version 4.1. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Kaplan-Meier Chebyshev UCL (95% KM); 95% Approximate Gamma UCL (App-G); 95% Chebyshev (mean, std) UCL (95% Cheb-m); 95% H-Stat UCL (95% H-UCL); 95% Kaplan Meier BCA UCL (95% KM-BCA); 95% Kaplan-Meier (% bootstrap) UCL (95% KM-b); 95% Student's-T test UCL (95% Stud-t); Maximum Detected Value (Max)

Upper Confidence Limit (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) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive
(5) Maximum detected concentration used because constituent detected in only one sample.
(6) Maximum value used because calculated UCL exceeds maximum concentration.

NP = Non-Parametric
G = Gamma
MG/KG = Milligrams per kilogram
J = Estimated Value
L = Biased Low
T = Lognormal
N = Normal

Table 3.13

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Emissions from Soil* Outside Waste Area	Chromium	mg/m^3	8.7E-09	1.0E-08 T	3.2E-08	1.0E-08	mg/m^3	95% H-UCL	1

Notes:

ProUCL, Version 4.1 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. ProUCL, Version 4.1. Prepared by Lockheed Martin Environmental Services).

Options: 95% H-Stat UCL (95% H-UCL)

Upper Confidence Limit (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) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive
(5) Maximum detected concentration used because constituent detected in only one sample.
(6) Maximum value used because calculated UCL exceeds maximum concentration.

NP = Non-Parametric
G = Gamma
mg/m^3 = milligrams per cubic m
J = Estimated Value
T = Lognormal

Table 3.14
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 24
NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Cornwalis Cave Shallow Aquifer - Tap Water and Water in Excavation Pit	Heptachlor epoxide	ug/L	1.4E-02	2.7E-02 NP	2.8E-02 J	2.7E-02	ug/L	95% KM-t	1, 2
	RDX	ug/L	NA	NA	1.8E+00 J	1.8E+00	ug/L	Max	3

Notes:

ProUCL, Version 4.00.05 used to determine distribution of data and calculate 95% UCL, following recommendations in users guide (USEPA. May 2010. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier Chebyshev (t) UCL (95% KM-t); Maximum Detected Value (Max)

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) Maximum detected concentration used because constituent detected in only one sample.

J - Estimated Value

ug/L = micrograms per liter

Table 3.15

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Yorktown-Eastover Deep Aquifer Tap Water	Heptachlor epoxide	UG/L	NA	NA	9.8E-03 J	9.8E-03	UG/L	Max	(1)
	Manganese	UG/L	NA	NA	1.1E+02	1.1E+02	UG/L	Max	(1)

Notes:

Options: Maximum Detected Value (Max)

UCL Rationale:

(1) Maximum detected concentration used because less than 5 samples.

J - Estimated Value

ug/L = micrograms per liter

NA = Not Applicable

TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser/Visitor	Adult	Surface Soil In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.1, 3.3, or 3.5	mg/kg	See Table 3.1, 3.3, or 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, and Outside	IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Waste Area	EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent	Surface Soil In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.1, 3.3, or 3.5	mg/kg	See Table 3.1, 3.3, or 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, and Outside	IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Waste Area	EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	9	years	(2)	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	51	kg	EPA, 1997, (3)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Industrial Worker	Adult	Surface Soil In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.1, 3.3, or 3.5	mg/kg	See Table 3.1, 3.3, or 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, and Outside	IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Waste Area	EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser/Visitor	Adult	Surface Soil In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.1, 3.3, or 3.5	mg/kg	See Table 3.1, 3.3, or 3.5	CDI (mg/kg-day) =
			Across Site, and Outside	SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
			Waste Area	SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent	Surface Soil In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.1, 3.3, or 3.5	mg/kg	See Table 3.1, 3.3, or 3.5	CDI (mg/kg-day) =
			Across Site, and Outside	SA	Skin Surface Area Available for Contact	3,800	cm^2	EPA, 2004, (4)	CS x SA x SSAF x DABS x CF1 x EF x
			Waste Area	SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (5)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	9	years	(2)	
				BW	Body Weight	51	kg	EPA, 1997,(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Industrial Worker	Adult	Surface Soil In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.1, 3.3, or 3.5	mg/kg	See Table 3.1, 3.3, or 3.5	CDI (mg/kg-day) =
			Across Site, and Outside	SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
			Waste Area	SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Notes:

(1) Professional Judgement assuming 2 day per week for 26 weeks per year.

(2) Professional Judgement assuming adolescents from 9 to 18 years of age.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

(4) Surface area includes face, forearms, hands, and lower legs for children 9-18 year old.

(5) Soil to skin adherence factor is based on 95th percentile adherence factor for soccer players #1 (age 13-15 years).

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.2.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Trespasser/Visitor	Adult	Emissions from Surface Soil in Waste Area, Across Site, and Outside Waste Area	CS	Chemical Concentration in Soil	See Table 3.2, 3.4, or 3.6	mg/kg	See Table 3.2, 3.4, or 3.6	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	calc	mg/m^3		CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent	Emissions from Surface Soil in Waste Area, Across Site, and Outside Waste Area	CS	Chemical Concentration in Soil	See Table 3.2, 3.4, or 3.6	mg/kg	See Table 3.2, 3.4, or 3.6	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	calc	mg/m^3		CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	9	years	(2)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Industrial Worker	Adult	Emissions from Surface Soil in Waste Area, Across Site, and Outside Waste Area	CS	Chemical Concentration in Soil	See Table 3.2, 3.4, or 3.6	mg/kg	See Table 3.2, 3.4, or 3.6	
				CA	Chemical Concentration in Air	calc	mg/m^3	- -	Exposure Concentration (EC) (mg/m^3) =
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	
				ET	Exposure Time	8	hr/day	(3)	CA (mg/m^3) = CS (1/PEF + 1/VF)
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Notes:

(1) Professional Judgement assuming 2 day per week for 26 weeks per year, and 4 hours per day.

(2) Professional Judgement assuming adolescents from 9 to 18 years of age.

(3) Professional Judgement. Assume 8 hour workday

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser/Visitor	Adult	Soil* in Sludge Area	CS	Chemical Concentration in Soil	See Table 3.7	mg/kg	See Table 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent	Soil* in Sludge Area	CS	Chemical Concentration in Soil	See Table 3.7	mg/kg	See Table 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	9	years	(2)	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	51	kg	EPA, 1997, (3)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Industrial Worker	Adult	Soil* in Sludge Area	CS	Chemical Concentration in Soil	See Table 3.7	mg/kg	See Table 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser/Visitor	Adult	Soil* in Sludge Area	CS	Chemical Concentration in Soil	See Table 3.7	mg/kg	See Table 3.5	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent	Soil* in Sludge Area	CS	Chemical Concentration in Soil	See Table 3.7	mg/kg	See Table 3.5	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,800	cm^2	EPA, 2004, (4)	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (5)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	9	years	(2)	
				BW	Body Weight	51	kg	EPA, 1997,(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Industrial Worker	Adult	Soil* in Sludge Area	CS	Chemical Concentration in Soil	See Table 3.7	mg/kg	See Table 3.5	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Notes:

* Surface soil & subsurface soil combined

(1) Professional Judgement assuming 2 day per week for 26 weeks per year.

(2) Professional Judgement assuming adolescents from 9 to 18 years of age.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

(4) Surface area includes face, forearms, hands, and lower legs for children 9-18 year old.

(5) Soil to skin adherence factor is based on 95th percentile adherence factor for soccer players #1 (age 13-15 years).

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

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TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.7, 3.8, 3.10, or 3.12	mg/kg	See Table 3.7, 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, Outside Waste	IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Area, and Sludge Area	EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.7, 3.8, 3.10, or 3.12	mg/kg	See Table 3.7, 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, Outside Waste	IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Area, and Sludge Area	EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.7, 3.8, 3.10, or 3.12	mg/kg	See Table 3.7, 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, Outside Waste	IR-S-A	Ingestion Rate of Soil, Adult	100	mg/day	EPA, 1991	CS x IR-S-Adj x EF x CF1 x 1/AT
			Area, and Sludge Area	IR-S-C	Ingestion Rate of Soil, Child	200	mg/day	EPA, 1991	
				IR-S-Adj	Ingestion Rate of Soil, Age-adjusted	114.29	mg-year/kg-day	Calculated	IR-S-Adj (mg-year/kd-day) =
				EF	Exposure Frequency	350	days/year	EPA, 1991	(ED-C x IR-S-C / BW-C) + (ED-A x IR-S-A / BW-A)
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
	Construction Worker	Adult	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.7, 3.8, 3.10, or 3.12	mg/kg	See Table 3.7, 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, Outside Waste	IR-S	Ingestion Rate of Soil	480	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Area, and Sludge Area	EF	Exposure Frequency	125	days/year	(1)	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Soil* In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, and Outside	IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Waste Area	EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Trespasser/Visitor	Adult	Soil* In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, and Outside	IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Waste Area	EF	Exposure Frequency	52	days/year	(5)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent	Soil* In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
			Across Site, and Outside	IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
			Waste Area	EF	Exposure Frequency	52	days/year	(5)	
				ED	Exposure Duration	9	years	(6)	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	51	kg	EPA, 1997, (7)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.7, 3.8, 3.10, or 3.12	mg/kg	See Table 3.7, 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, Outside Waste	SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
			Area, and Sludge Area	SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 1995; EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
	Resident	Child	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.7, 3.8, 3.10, or 3.12	mg/kg	See Table 3.7, 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, Outside Waste	SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
			Area, and Sludge Area	SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Resident	Child/Adult	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.7, 3.8, 3.10, or 3.12	mg/kg	See Table 3.7, 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, Outside Waste	SA-A	Skin Surface Area Available for Contact, Adult	5,700	cm^2	EPA, 2004	CS x DA-Adj x DABS x CF1 x EF x 1/AT
			Area, and Sludge Area	SA-C	Skin Surface Area Available for Contact, Child	2,800	cm^2	EPA, 2004	
				SSAF-A	Soil to Skin Adherence Factor, Adult	0.07	mg/cm^2-day	EPA, 2004	DA-Adj (mg-year/kg-day) =
				SSAF-C	Soil to Skin Adherence Factor, Child	0.2	mg/cm^2-day	EPA, 2004	
				DA-Adj	Dermal Absorption, Age-adjusted	361	mg-year/kg-day	Calculated	(ED-C x SA-C x SSAF-C / BW-C) + (ED-A x SA-A x SSAF-A / BW-A)
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 1995; EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Construction Worker	Adult	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.7, 3.8, 3.10, or 3.12	mg/kg	See Table 3.7, 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, Outside Waste	SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004, (3)	CS x SA x SSAF x DABS x CF1 x EF x
			Area, and Sludge Area	SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (4)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	125	days/year	(1)	
				ED	Exposure Duration	1	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Industrial Worker	Adult	Soil* In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, and Outside	SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
			Waste Area	SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser/Visitor	Adult	Soil* In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, and Outside	SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
			Waste Area	SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(5)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent	Soil* In Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, and Outside	SA	Skin Surface Area Available for Contact	3,800	cm^2	EPA, 2004, (8)	CS x SA x SSAF x DABS x CF1 x EF x
			Waste Area	SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (9)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(5)	
				ED	Exposure Duration	9	years	(6)	
				BW	Body Weight	51	kg	EPA, 1997, (7)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

Notes:

* Surface soil & subsurface soil combined

(1) Assumed duration of construction project is 1/2 of a working year.

(2) Professional Judgement assuming 1 day per week for one-half the year (i.e., 26 weeks).

(3) Surface area for commercial/industrial worker.

(4) Soil to skin adherence factor is based on 95th percentile adherence factor for construction workers.

(5) Professional Judgement assuming 2 day per week for 26 weeks per year.

(6) Professional Judgement assuming adolescents from 9 to 18 years of age.

(7) Body weight is average value for the 9 year old and 18 year old male body weight.

(8) Surface area includes face, forearms, hands, and lower legs for children 9-18 year old.

(9) Soil to skin adherence factor is based on 95th percentile adherence factor for soccer players #1 (age 13-15 years).

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

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TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.9, 3.11, or 3.13	mg/kg	See Table 3.9, 3.11, or 3.13	Exposure Concentration (EC) (mg/m^3) =
			In Waste Area,	CA	Chemical Concentration in Air	calc	mg/m^3		CA x ET x EF x ED x CF x 1/AT
			Across Site, and	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
			Outside Waste Area	VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ET	Exposure Time	24	hour/day	--	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.9, 3.11, or 3.13	mg/kg	See Table 3.9, 3.11, or 3.13	Exposure Concentration (EC) (mg/m^3) =
			In Waste Area,	CA	Chemical Concentration in Air	calc	mg/m^3		CA x ET x EF x ED x CF x 1/AT
			Across Site, and	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 1996	
			Outside Waste Area	VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 1996	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	24	hour/day	--	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.9, 3.11, or 3.13	mg/kg	See Table 3.9, 3.11, or 3.13	Exposure Concentration (EC) (mg/m3) =
			In Waste Area,	CA	Chemical Concentration in Air	calc	mg/m^3	- -	CA x ET x EF x ED x CF x 1/AT
			Across Site, and	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 1996	
			Outside Waste Area	VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 1996	CA (mg/m3) = CS (1/PEF + 1/VF)
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ET	Exposure Time	24	hr/day	EPA, 1991	
				ED	Exposure Duration	30	years	EPA, 2002	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.9, 3.11, or 3.13	mg/kg	See Table 3.9, 3.11, or 3.13	Exposure Concentration (EC) (mg/m^3) =
			In Waste Area,	CA	Chemical Concentration in Air	calc	mg/m^3	- -	CA x ET x EF x ED x CF x 1/AT
			Across Site, and	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 1996	
			Outside Waste Area	VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 1996	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(1)	
				EF	Exposure Frequency	125	days/year	(1)	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Industrial Worker	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.9, 3.11, or 3.13	mg/kg	See Table 3.9, 3.11, or 3.13	Exposure Concentration (EC) (mg/m^3) =
			In Waste Area,	CA	Chemical Concentration in Air	calc	mg/m^3	- -	CA x ET x EF x ED x CF x 1/AT
			Across Site, and	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 1996	
			Outside Waste Area	VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 1996	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(2)	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Trespasser/Visitor	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.9, 3.11, or 3.13	mg/kg	See Table 3.9, 3.11, or 3.13	Exposure Concentration (EC) (mg/m^3) =
			In Waste Area,	CA	Chemical Concentration in Air	calc	mg/m^3		CA x ET x EF x ED x CF x 1/AT
			Across Site, and	PEF	Particulate Emissions Factor	1.32E+09	m^3/kg	EPA, 2002	
			Outside Waste Area	VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	4	hr/day	(3)	
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Trespasser/Visitor	Adolescent	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.9, 3.11, or 3.13	mg/kg	See Table 3.9, 3.11, or 3.13	Exposure Concentration (EC) (mg/m^3) =
			In Waste Area,	CA	Chemical Concentration in Air	calc	mg/m^3		CA x ET x EF x ED x CF x 1/AT
			Across Site, and	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
			Outside Waste Area	VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	4	hr/day	(3)	
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	9	years	(4)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

* Surface soil & subsurface soil combined

(1) Professional Judgement. Assumed duration of construction project is 1/2 of a working year, and construction workers work 8 hours/day.

(2) Professional Judgement. Assume 8 hour workday

(3) Professional Judgement assuming 2 day per week for 26 weeks per year, and 4 hours per day.

(4) Professional Judgement assuming adolescents from 9 to 18 years of age.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Cornwalis Cave	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	Chronic Daily Intake (CDI) (mg/kg-day) =
			Shallow Aquifer	IR-W	Ingestion Rate of Water	2	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
			Tap Water and Water	EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Cornwalis Cave	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) =
			Shallow Aquifer	IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
			Tap Water and Water	EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Cornwalis Cave	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) =
			Shallow Aquifer	IR-W-A	Ingestion Rate of Water, Adult	2	liters/day	EPA, 1997	CW x IR-W-Adj x EF x CF2 x 1/AT
			Tap Water	IR-W-C	Ingestion Rate of Water, Child	1	liters/day	EPA, 1997	
				IR-W-Adj	Ingestion Rate of Water, Age-adjus	1.09	liter-year/kg-day	calculated	IR-W-Adj (liter-year/kd-day) =
				EF	Exposure Frequency	350	days/year	EPA, 1991	(ED-C x IR-W-C / BW-C) +
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	(ED-A x IR-W-A / BW-A)
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Cornwalis Cave Shallow Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1991	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
Dermal	Resident	Adult	Cornwalis Cave Shallow Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.58	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Cor	18,000	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	24	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Child	Cornwalis Cave	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) =
			Shallow Aquifer	DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
			Tap Water	FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	1.0	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Cor	6,600	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	6	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
		Child/Adult	Cornwalis Cave	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) = DA-Adj x EF x 1/AT
			Shallow Aquifer	DAevent-A	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	
			Tap Water	DAevent-C	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DA-Adj = (Daevent-A x SA-A x ED-A x 1/BW-A)
				DA-Adj	Dermally Absorbed Dose, Age-adju	calculated	mg-year/event-kg	calculated	+ (Daevent-C x SA-C x ED-C x 1/BW-C)
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}-A	Event Time, Adult	0.58	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				t_{event}-C	Event Time, Child	1.0	hr/event	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				SA-A	Skin Surface Area, Adult	18,000	cm^2	EPA, 2004	x CF2 x CF3
				SA-C	Skin Surface Area, Child	6,600	cm^2	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (continued)	Resident	Child/Adult	Cornwalis Cave Shallow Aquifer Tap Water	EF	Exposure Frequency	350	days/year	EPA, 2004	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				ED-A	Exposure Duration, Adult	24	years	EPA, 2004	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				ED-C	Exposure Duration, Child	6	years	EPA, 2004	
				BW-A	Body Weight, Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
		Adult	Cornwalis Cave Shallow Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.11.RME	µg/l	See Table 3.11.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	8	hr/day	(1)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Cor	5,700	cm^2	EPA, 2004, (2)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	125	days/year	VDEQ, 2010	
				ED	Exposure Duration	1	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
	Construction Worker	Adult	Cornwalis Cave Shallow Aquifer Water in Excavation	CW	Chemical Concentration in Water	See Table 3.11.RME	µg/l	See Table 3.11.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Construction Worker	Adult	Cornwalis Cave	B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
(continued)			Shallow Aquifer	t_{event}	Event Time	8	hr/day	(1)	t_{event}<t*: DAevent (mg/cm^2-event) =
			Water in	SA	Skin Surface Area Available for Cor	5,700	cm^2	EPA, 2004, (2)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
			Excavation	EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	125	days/year	VDEQ, 2010	
				ED	Exposure Duration	1	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + 3B^2)/(1+B)^2)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

(1) Professional judgment based on construction activities that would occur 8 hrs per day for the RME.

(2) Skin surface area in contact with groundwater assumed to be hands, forearms, lower legs, and feet.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2010: Viriginia Department of Envirommental Quality, Voluntary Remediaion Program Risk Assessment Guidance.

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	Chronic Daily Intake (CDI) (mg/kg-day) = CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				IR-W	Ingestion Rate of Water	2	liters/day	EPA, 1997	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) = CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1997	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) = CW x IR-W-Adj x EF x CF2 x 1/AT
				IR-W-A	Ingestion Rate of Water, Adult	2	liters/day	EPA, 1997	
				IR-W-C	Ingestion Rate of Water, Child	1	liters/day	EPA, 1997	
				IR-W-Adj	Ingestion Rate of Water, Age-adjus	1.09	liter-year/kg-day	calculated	IR-W-Adj (liter-year/kd-day) = (ED-C x IR-W-C / BW-C) + (ED-A x IR-W-A / BW-A)
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1991	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
Dermal	Resident	Adult	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.58	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Cor	18,000	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	24	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Child	Yorktown-Eastover	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) =
			Deep Aquifer	DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
			Tap Water	FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	1.0	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Cor	6,600	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	6	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
		Child/Adult	Yorktown-Eastover	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) = DA-Adj x EF x 1/AT
			Deep Aquifer	DAevent-A	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	
			Tap Water	DAevent-C	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DA-Adj = (Daevent-A x SA-A x ED-A x 1/BW-A)
				DA-Adj	Dermally Absorbed Dose, Age-adju	calculated	mg-year/event-kg	calculated	+ (Daevent-C x SA-C x ED-C x 1/BW-C)
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}-A	Event Time, Adult	0.58	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				t_{event}-C	Event Time, Child	1.0	hr/event	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				SA-A	Skin Surface Area, Adult	18,000	cm^2	EPA, 2004	x CF2 x CF3
				SA-C	Skin Surface Area, Child	6,600	cm^2	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (continued)	Resident	Child/Adult	Yorktown-Eastover Deep Aquifer Tap Water	EF	Exposure Frequency	350	days/year	EPA, 2004	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x ((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				ED-A	Exposure Duration, Adult	24	years	EPA, 2004	
				ED-C	Exposure Duration, Child	6	years	EPA, 2004	
				BW-A	Body Weight, Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
		Adult	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.12.RME	µg/l	See Table 3.12.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	8	hr/day	(1)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Cor	5,700	cm^2	EPA, 2004, (2)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	125	days/year	VDEQ, 2010	
				ED	Exposure Duration	1	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

(1) Professional judgment based on construction activities that would occur 8 hrs per day for the RME.

(2) Skin surface area in contact with groundwater assumed to be hands, forearms, lower legs, and feet.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2010: Viriginia Department of Envirommental Quality, Voluntary Remediaion Program Risk Assessment Guidance.

TABLE 4.1.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Surface Soil In Waste Area	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg	See Table 3.1	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	219	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	- -	
Dermal	Industrial Worker	Adult	Surface Soil In Waste Area	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg	See Table 3.1	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	219	days/year	EPA, 2004	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

Sources:

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.2.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Site 24
NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Soil* in Waste Area, Across Site, and Outside Waste Area	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 1993	
				CF1	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	3285	days	EPA, 1989	
		Child	Soil* in Waste Area, Across Site, and Outside Waste Area	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	2190	days	EPA, 1989	
		Child/Adult	Soil* in Waste Area, Across Site, and Outside Waste Area	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S-A	Ingestion Rate of Soil, Adult	50	mg/day	EPA, 1991	CS x IR-S-Adj x EF x CF1 x 1/AT
				IR-S-C	Ingestion Rate of Soil, Child	100	mg/day	EPA, 1991	
				IR-S-Adj	Ingestion Rate of Soil, Age-adjusted	46.4	mg-year/kg-day	Calculated	IR-S-Adj (mg-year/kd-day) = (ED-C x IR-S-C / BW-C) + (ED-A x IR-S-A / BW-A)
				EF	Exposure Frequency	234	days/year	EPA, 1991	
				ED-A	Exposure Duration, Adult	9	years	EPA, 1991	
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg		
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
	Construction Worker	Adult	Soil* in Waste Area	CS	Chemical Concentration in Soil	See Table 3.8	mg/kg	See Table 3.8	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	125	days/year	Prof. Judgement (1)	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

TABLE 4.2.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Site 24
NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Soil* in Waste Area	CS	Chemical Concentration in Soil	See Table 3.8	mg/kg	See Table 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	219	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
Dermal	Resident	Adult	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, and Outside	SA	Skin Surface Area Available for Contact	5,700	cm2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
			Waste Area	SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 1993	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, and Outside	SA	Skin Surface Area Available for Contact	2,800	cm2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
			Waste Area	SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Soil* in Waste Area,	CS	Chemical Concentration in Soil	See Table 3.8, 3.10, or 3.12	mg/kg	See Table 3.8, 3.10, or 3.12	CDI (mg/kg-day) =
			Across Site, and Outside	SA-A	Skin Surface Area Available for Contact, Adult	5,700	cm2	EPA, 2004	CS x DA-Adj x DABS x CF3 x EF x 1/AT
			Waste Area	SA-C	Skin Surface Area Available for Contact, Child	2,800	cm2	EPA, 2004	
				SSAF-A	Soil to Skin Adherence Factor	0.01	mg/cm2-day	EPA, 2004	DA-Adj (mg-year/kd-day) =
				SSAF-C	Soil to Skin Adherence Factor	0.04	mg/cm2-day	EPA, 2004	[(ED-C x SA-C x SSAF-C / BW-C) +
				DA-Adj	Dermal Absorption, Age-adjusted	52.13	mg-year/kg-day	calculated	(ED-A x SA-A x SSAF-A / BW-A)]
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED-A	Exposure Duration, Adult	9	years	EPA, 1993	
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	

TABLE 4.2.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Site 24
NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Construction Worker	Adult	Soil* in Waste Area	CS	Chemical Concentration in Soil	See Table 3.8	mg/kg	See Table 3.8	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm2	EPA, 2004 (2)	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.06	mg/cm2-day	EPA, 2004 (3)	ED x 1/BW x 1/AT
				CF1	Conversion Factor 1	chem specific	--	EPA, 2004	
				EF	Exposure Frequency	0.000001	kg/mg	- -	
				ED	Exposure Duration	63	days/year	Prof. Judgement (1)	
				BW	Body Weight	1	years	EPA, 1991	
				AT-C	Averaging Time (Cancer)	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	25,550	days	EPA, 1989	
	Industrial Worker	Adult	Soil* in Waste Area	CS	Chemical Concentration in Soil	See Table 3.8	mg/kg	See Table 3.8	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	219	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

* Surface soil and subsurface soil combined.

Notes:

(1) Assumed duration of construction project is 1/2 of a working year.
(2) Surface area for industrial worker; assumes the worker wears long pants, shoes, and a short-sleeved shirt.
(3) The AF for groundskeepers which is based on the 95th percentile weighted AF.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

TABLE 4.4.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Child/Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.9	mg/kg	See Table 3.9	Exposure Concentration (EC) (mg/m3) =
			In Waste Area,	CA	Chemical Concentration in Air	calc	mg/m^3	- -	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 1996	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 1996	CA (mg/m3) = CS (1/PEF + 1/VF)
				EF	Exposure Frequency	234	days/year	EPA, 1991	
				ET	Exposure Time	24	hr/day	EPA, 1991	
				ED	Exposure Duration	30	years	EPA, 2002	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

* Surface soil & subsurface soil combined

(1) Professional Judgement. Assumed duration of construction project is 1/2 of a working year, and construction workers work 8 hours/day.

(2) Professional Judgement. Assume 8 hour workday

(3) Professional Judgement assuming 2 day per week for 26 weeks per year, and 4 hours per day.

(4) Professional Judgement assuming adolescents from 9 to 18 years of age.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.5.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child/Adult	Cornwalis Cave Shallow Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) =
				IR-W-A	Ingestion Rate of Water, Adult	1.4	liters/day	EPA, 1993	CW x IR-W-Adj x EF x CF2 x 1/AT
				IR-W-C	Ingestion Rate of Water, Child	1	liters/day	EPA, 1997	
				IR-W-Adj	Ingestion Rate of Water, Age-adjusted	0.58	liter-year/kg-day	calculated	IR-W-Adj (liter-year/kd-day) =
				EF	Exposure Frequency	234	days/year	EPA, 1993	(ED-C x IR-W-C / BW-C) +
				ED-A	Exposure Duration, Adult	9	years	EPA, 1993	(ED-A x IR-W-A / BW-A)
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
Dermal	Resident	Child/Adult	Cornwalis Cave Shallow Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) = DA-Adj x EF x 1/AT
				DAevent-A	Dermally Absorbed Dose per Event, Adult	Calculated	mg/cm^2-event	calculated	
				DAevent-C	Dermally Absorbed Dose per Event, Child	Calculated	mg/cm^2-event	calculated	DA-Adj = (Daevent-A x SA-A x ED-A x 1/BW-A)
				DA-Adj	Dermally Absorbed Dose, Age-adjusted	Calculated	mg-year/event-kg	calculated	+ (Daevent-C x SA-C x ED-C x 1/BW-C)
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}-A	Event Time, Adult	0.25	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				t_{event}-C	Event Time, Child	0.33	hr/event	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				SA-A	Skin Surface Area, Adult	18,000	cm^2	EPA, 2004	x CF2 x CF3
				SA-C	Skin Surface Area, Child	6,600	cm^2	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				EF	Exposure Frequency	234	days/year	EPA, 1993	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				ED-A	Exposure Duration, Adult	9	years	EPA, 2001	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				ED-C	Exposure Duration, Child	6	years	EPA, 2001	
				BW-A	Body Weight, Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

TABLE 4.5.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Construction Worker	Adult	Cornwalis Cave	CW	Chemical Concentration in Water	See Table 3.14	µg/l	See Table 3.14	CDI (mg/kg-day) =
			Shallow Aquifer	DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
			Water in	FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
			Excavation	K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	4	hr/day	(1)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (3)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	125	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

(1) Professional judgment assuming 1/2 RME value for CT.

(2) Assumed duration of construction project may be 1/2 a year.

(3) Skin surface area in contact with groundwater assumed to be hands, forearms, lower legs, and feet.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.6.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1.4	liters/day	EPA, 1993	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 1993	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
Dermal	Resident	Adult	Yorktown-Eastover Deep Aquifer Tap Water	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.25	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	18,000	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

TABLE 4.6.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS, Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Child	Yorktown-Eastover	CW	Chemical Concentration in Water	See Table 3.15	µg/l	See Table 3.15	CDI (mg/kg-day) =
			Deep Aquifer	DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
			Tap Water	FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.33	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	6,600	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 2001	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ (3)	Dates of RfD: Target Organ (4) (MM/DD/YY)
2,4-Dinitrotoluene	Chronic	2.0E-03	mg/kg-day	100%	2.0E-03	mg/kg-day	CNS, Blood, Biliary Tract	100/1	IRIS	1/19/2011
	Subchronic	2.0E-03	mg/kg-day	100%	2.0E-03	mg/kg-day	CNS, Blood, Biliary Tract	100	HEAST	7/1997
2,4,6-Trinitrotoluene	Chronic	5.0E-04	mg/kg-day	100%	5.0E-04	mg/kg-day	Liver	1000/1	IRIS	1/19/2011
	Subchronic	5.0E-04	mg/kg-day	100%	5.0E-04	mg/kg-day	Liver	1000	ATSDR	6/1995
alpha-BHC	Chronic	8.0E-03	mg/kg-day	100%	8.0E-03	mg/kg-day	Liver	100	ATSDR	9/05
	Subchronic	NA			NA					
Aluminum	Chronic	1.0E+00	mg/kg-day	100%	1.0E+00	mg/kg-day	Neurological	100	PPRTV	10/23/2006
	Subchronic	1.0E+00	mg/kg-day	100%	1.0E+00	mg/kg-day	Neurological	100	ATSDR	9/2008
Antimony	Chronic	4.0E-04	mg/kg-day	15%	6.0E-05	mg/kg-day	Longevity, Blood	1000/1	IRIS	1/19/2011
	Subchronic	4.0E-04	mg/kg-day	15%	6.0E-05	mg/kg-day	Whole Body, Blood	1000	PPRTV	10/2006
Aroclor-1254	Chronic	2.0E-05	mg/kg-day	100%	2.0E-05	mg/kg-day	Ocular, Finger and Toe Nails	300/1	IRIS	1/19/2011
	Subchronic	3.0E-05	mg/kg-day	100%	3.0E-05	mg/kg-day	Immune System	300	ATSDR	11/2000
Aroclor-1260	Chronic	NA			NA					
	Subchronic	NA			NA					
Arsenic	Chronic	3.0E-04	mg/kg-day	95%	3.0E-04	mg/kg-day	Skin, Vascular	3/1	IRIS	1/19/2011
	Subchronic	3.0E-04	mg/kg-day	95%	3.0E-04	mg/kg-day	Skin, Vascular	3	HEAST	7/1997
Benzo(a)anthracene	Chronic	NA			NA					
	Subchronic	NA			NA					
Benzo(a)pyrene	Chronic	NA			NA					
	Subchronic	NA			NA					
Benzo(b)fluoranthene	Chronic	NA			NA					
	Subchronic	NA			NA					
Benzo(k)fluoranthene	Chronic	NA			NA					
	Subchronic	NA			NA					
Cadmium (diet)	Chronic	1.0E-03	mg/kg-day	2.5%	2.5E-05	mg/kg-day	Proteinuria (Kidney)	10/1	IRIS	1/19/2011
	Subchronic	NA			NA					
Cadmium (water)	Chronic	5.0E-04	mg/kg-day	5%	2.5E-05	mg/kg-day	Proteinuria (Kidney)	10/1	IRIS	1/19/2011
	Subchronic	NA			NA					

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ (3)	Dates of RfD: Target Organ (4) (MM/DD/YY)
Chromium (III)	Chronic	1.5E+00	mg/kg-day	1.3%	2.0E-02	mg/kg-day	Not identified	100/10	IRIS	1/19/2011
	Subchronic	1.5E+00	mg/kg-day	1%	2.0E-02	mg/kg-day	Not identified	1000	HEAST	7/1997
Chromium (VI)	Chronic	3.0E-03	mg/kg-day	2.5%	7.5E-05	mg/kg-day	Not identified	300/3	IRIS	1/19/2011
	Subchronic	2.0E-02	mg/kg-day	2.5%	5.0E-04	mg/kg-day	Not identified	100	HEAST	7/1997
Chrysene	Chronic	NA			NA					
	Subchronic	NA			NA					
Cobalt	Chronic	3.0E-04	mg/kg-day	100%	3.0E-04	mg/kg-day	Thyroid	3000	PPRTV	8/25/2008
	Subchronic	3.0E-03	mg/kg-day	100%	3.0E-03	mg/kg-day	Thyroid	300	PPRTV	8/25/2008
Copper	Chronic	4.0E-02	mg/kg-day	100%	4.0E-02	mg/kg-day	Gastrointestinal	N/A	HEAST	7/1997
	Subchronic	1.0E-02	mg/kg-day	100%	1.0E-02	mg/kg-day	Gastrointestinal	3	ASTDR	10/2004
Dibenz(a,h)anthracene	Chronic	NA			NA					
	Subchronic	NA			NA					
Dieldrin	Chronic	5.0E-05	mg/kg-day	100%	5.0E-05	mg/kg-day	Liver	100/1	IRIS	1/19/2011
	Subchronic	1.0E-04	mg/kg-day	100%	1.0E-04	mg/kg-day	Liver	100	ASTDR	9/2002
Heptachlor	Chronic	5.0E-04	mg/kg-day	100%	5.0E-04	mg/kg-day	Liver	300/1	IRIS	1/19/2011
	Subchronic	1.0E-04	mg/kg-day	100%	1.0E-04	mg/kg-day	Liver	300	ASTDR	8/2007
Heptachlor epoxide	Chronic	1.3E-05	mg/kg-day	100%	1.3E-05	mg/kg-day	Liver	1000/1	IRIS	1/19/2011
	Subchronic	1.3E-05	mg/kg-day	100%	1.3E-05	mg/kg-day	Liver	1000	HEAST	7/1997
Indeno(1,2,3-cd)pyrene	Chronic	NA			NA					
	Subchronic	NA			NA					
Iron	Chronic	7.0E-01	mg/kg-day	100%	7.0E-01	mg/kg/day	Gastrointestinal	1	PPRTV	7/29/2005
	Subchronic	7.0E-01	mg/kg-day	100%	7.0E-01	mg/kg/day	Gastrointestinal	1	PPRTV	7/29/2005
Manganese (diet)	Chronic	1.4E-01	mg/kg-day	100%	1.4E-01	mg/kg-day	CNS	1/1	IRIS	1/19/2011
	Subchronic	1.4E-01	mg/kg-day	100%	1.4E-01	mg/kg/day	CNS	1	HEAST	7/1997
Manganese (water)	Chronic	2.4E-02	mg/kg-day	4%	9.6E-04	mg/kg-day	CNS	1/1	IRIS	1/19/2011
	Subchronic	NA			NA					
Methylmercury	Chronic	1.0E-04	mg/kg-day	100%	1.0E-04	mg/kg-day	Developmental, Neurological	10/1	IRIS	1/19/2011
	Subchronic	1.0E-04	mg/kg-day	100%	1.0E-04	mg/kg-day	Developmental, Neurological	10	HEAST	7/1997
Naphthalene	Chronic	2.0E-02	mg/kg-day	100%	2.0E-02	mg/kg-day	Decreased Body Weight	3000/1	IRIS	1/19/2011
	Subchronic	6.0E-01	mg/kg-day	100%	6.0E-01	mg/kg-day	Decreased Body Weight	9.0E+01	ASTDR	9/2005
n-Nitroso-di-n-propylamine	Chronic	NA			NA					
	Subchronic	NA			NA					

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ (3)	Dates of RfD: Target Organ (4) (MM/DD/YY)
RDX	Chronic	3.0E-03	mg/kg-day	100%	3.0E-03	mg/kg-day	Prostate	100/1	IRIS	1/19/2011
	Subchronic	5.0E-02	mg/kg-day	100%	5.0E-02	mg/kg-day	Prostate	100	ASTDR	7/2010
Vanadium	Chronic	5.0E-03	mg/kg-day	100%	5.0E-03	mg/kg-day	Hair	100/1	RSL	11/2010
	Subchronic	NA			NA					

NA = Not Applicable or Not Available.

CNS = Central Nervous System

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment (Final).
Section 4.2 and Exhibit 4-1. USEPA recommends that the oral RfD should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50%.
Constituents with oral absorption efficiencies greater than 50%, or without reported oral absorption efficiencies, are shown with an oral absorption efficiency of 100%.

(2) Adjusted Dermal RfD = RfD (oral) x Oral to Dermal Adjustment Factor

(3) ATSDR = Agency for Toxic Substances and Disease Registry
HEAST = Health Effects Summary Tables
IRIS = Integrated Risk Information System
PPRTV = Provisional Peer Reviewed Toxicity Value, Superfund Health Technical Support Center
RSL = Regional Screening Level Table

(4) For ATSDR values, the date of the ATSDR toxicity profile
For HEAST values, date of HEAST document.
For IRIS values, the date IRIS was searched.
For PPRTV values, date of the PPRTV document.
For RSL values, date of RSL Table.

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ (1)	Dates (2) (MM/DD/YY)
Chromium (VI)	Chronic Subchronic	1.0E-04 NA	mg/m^3	Respiratory System	300/1	IRIS	1/19/2011

NA = Not Applicable or Not Available

(1) HEAST = Health Effects Summary Tables

IRIS = Integrated Risk Information System

(2) For HEAST values, date of HEAST document.

For IRIS values, the date IRIS was searched.

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	EPA Carcinogen Group (3)	Source (4)	Date (5) (MM/DD/YY)
2,4-Dinitrotoluene	3.1E-01	100%	3.1E-01	(mg/kg-day) $^{-1}$	2B	CalEPA	1/19/2011
2,4,6-Trinitrotoluene	3.0E-02	100%	3.0E-02	(mg/kg-day) $^{-1}$	C	IRIS	1/19/2011
alpha-BHC	6.3E+00	100%	6.3E+00	(mg/kg-day) $^{-1}$	B2	IRIS	1/19/2011
Aluminum	NA		NA				
Antimony	NA		NA				
Aroclor-1254	2.0E+00	100%	2.0E+00	(mg/kg-day) $^{-1}$	B2	IRIS	1/19/2011
Aroclor-1260	2.0E+00	100%	2.0E+00	(mg/kg-day) $^{-1}$	B2	IRIS	1/19/2011
Arsenic	1.5E+00	100%	1.5E+00	(mg/kg-day) $^{-1}$	A	IRIS	1/19/2011
Benzo(a)anthracene (6)	7.3E-01	100%	7.3E-01	(mg/kg-day) $^{-1}$	B2	NCEA	7/1993
Benzo(a)pyrene (6)	7.3E+00	100%	7.3E+00	(mg/kg-day) $^{-1}$	B2	IRIS	1/19/2011
Benzo(b)fluoranthene (6)	7.3E-01	100%	7.3E-01	(mg/kg-day) $^{-1}$	B2	NCEA	7/1993
Benzo(k)fluoranthene (6)	7.3E-02	100%	7.3E-02	(mg/kg-day) $^{-1}$	B2	NCEA	7/1993
Cadmium	NA		NA		B1	IRIS	1/19/2011
Chromium (III)	NA		NA		D	IRIS	1/19/2011
Chromium (VI) (6)	5.0E-01	2.5%	2.0E+01	(mg/kg-day) $^{-1}$		NJ	1/19/2011
Chrysene (6)	7.3E-03	100%	7.3E-03	(mg/kg-day) $^{-1}$	B2	NCEA	7/1993
Cobalt	NA		NA				
Copper	NA		NA		D	IRIS	1/19/2011
Dibenz(a,h)anthracene (6)	7.3E+00	100%	7.3E+00	(mg/kg-day) $^{-1}$	B2	NCEA	7/1993
Dieldrin	1.6E+01	100%	1.6E+01	(mg/kg-day) $^{-1}$	B2	IRIS	1/19/2011
Heptachlor	4.5E+00	100%	4.5E+00	(mg/kg-day) $^{-1}$	B2	IRIS	1/19/2011
Heptachlor epoxide	9.1E+00	100%	9.1E+00	(mg/kg-day) $^{-1}$	B2	IRIS	1/19/2011
Indeno(1,2,3-cd)pyrene (6)	7.3E-01	100%	7.3E-01	(mg/kg-day) $^{-1}$	B2	NCEA	7/1993
Iron	NA		NA				
Manganese	NA		NA		D	IRIS	1/19/2011
Methylmercury	NA		NA		C	IRIS	1/19/2011
Naphthalene	NA		NA				
n-Nitroso-di-n-propylamine	7.0E+00	100%	7.0E+00	(mg/kg-day) $^{-1}$	B2	IRIS	1/19/2011

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	EPA Carcinogen Group (3)	Source (4)	Date (5) (MM/DD/YY)
RDX	1.1E-01	100%	1.1E-01	(mg/kg-day) $^{-1}$	C	IRIS	1/19/2011
Vanadium	NA		NA				

N/A-Not available

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment (Final).
Section 4.2 and Exhibit 4-1. USEPA recommends that the oral RfD should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50
Constituents with oral absorption efficiencies greater than 50%, or without reported oral absorption efficiencies, are shown with an oral absorption efficiency of 100%.

(2) Adjusted Dermal CSF = CSF (oral) / Oral to Dermal Adjustment Factor

(3) EPA Carcinogen Group:
- A - Human carcinogen
- B1 - Probable human carcinogen - indicates that limited human data are available
- B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
- C - Possible human carcinogen
- D - Not classifiable as a human carcinogen
- E - Evidence of noncarcinogenicity

IARC Carcinogen Group:
- 2A: The agent is probably carcinogenic to humans
- 2B: The agent is possibly carcinogenic to humans

(4) CalEPA = California EPA
IRIS = Integrated Risk Information System
NCEA = National Center for Environmental Assessment
NJ = New Jersey DEP

(5) For CalEPA values, the date CalEPA toxicity database was searched.
For IRIS values, the date IRIS was searched.
For NCEA values, the date of the NCEA document.
For New Jersey values, the date New Jersey DEP toxicity database was searched.

(6) This chemical operates with a mutagenic mode of action. *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens.* EPA/630/R-03/003F. March 2005(USEPA 2005).
Chemical-specific data are not available, thus, USEPA (2005) default age-dependant adjustment factors (ADAF) will be applied to the slope factor as follows:

AGE	AGE ADAF
0-<2	10
2-<16	3
16-<30	1

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Site 24 Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Unit Risk	Units	Weight of Evidence/ Cancer Guidance Description (1)	Source (2)	Date (3) (MM/DD/YY)
Chromium (VI) (4)	8.4E-02	$(ug/m3)^{-1}$	A	IRIS	1/19/2011

(1) EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

IARC Carcinogen Group:

2A: The agent is probably carcinogenic to humans

2B: The agent is possibly carcinogenic to humans

(2) IRIS = Integrated Risk Information System

(3) For IRIS values, the date IRIS was searched.

(4) This chemical operates with a mutagenic mode of action (USEPA 2005).

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil in Waste Area	Ingestion													
				Benzo(a)pyrene	4.0E-02	mg/kg	2.8E-09	mg/kg/day	7.3E+00	mg/kg/day	2.0E-08	8.1E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	3.8E-02	mg/kg	2.7E-09	mg/kg/day	7.3E-01	mg/kg/day	1.9E-09	7.7E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	2.9E-02	mg/kg	2.0E-09	mg/kg/day	7.3E-02	mg/kg/day	1.5E-10	5.9E-09	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	4.1E-08	mg/kg/day	2.0E+00	mg/kg/day	8.2E-08	1.2E-07	mg/kg/day	2.0E-05	mg/kg/day	6.0E-03
				Aluminum	9.1E+03	mg/kg	6.3E-04	mg/kg/day	NA		NA	1.9E-03	mg/kg/day	1.0E+00	mg/kg/day	1.9E-03
				Arsenic	3.2E+00	mg/kg	2.2E-07	mg/kg/day	1.5E+00	mg/kg/day	3.4E-07	6.5E-07	mg/kg/day	3.0E-04	mg/kg/day	2.2E-03
				Cadmium	7.9E+02	mg/kg	5.5E-05	mg/kg/day	NA		NA	1.6E-04	mg/kg/day	1.0E-03	mg/kg/day	1.6E-01
				Chromium	1.3E+01	mg/kg	9.2E-07	mg/kg/day	5.0E-01	mg/kg/day	4.6E-07	2.7E-06	mg/kg/day	3.0E-03	mg/kg/day	9.0E-04
				Cobalt	3.4E+00	mg/kg	2.4E-07	mg/kg/day	NA		NA	7.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.3E-03
				Iron	7.5E+03	mg/kg	5.2E-04	mg/kg/day	NA		NA	1.5E-03	mg/kg/day	7.0E-01	mg/kg/day	2.2E-03
			Exp. Route Total								9.0E-07					1.8E-01
			Dermal Absorption													
				Benzo(a)pyrene	4.0E-02	mg/kg	1.4E-09	mg/kg/day	7.3E+00	mg/kg/day	1.1E-08	4.2E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	3.8E-02	mg/kg	1.4E-09	mg/kg/day	7.3E-01	mg/kg/day	1.0E-09	4.0E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	2.9E-02	mg/kg	1.0E-09	mg/kg/day	7.3E-02	mg/kg/day	7.7E-11	3.1E-09	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	2.3E-08	mg/kg/day	2.0E+00	mg/kg/day	4.6E-08	6.7E-08	mg/kg/day	2.0E-05	mg/kg/day	3.4E-03
				Aluminum	9.1E+03	mg/kg	2.5E-05	mg/kg/day	NA		NA	7.4E-05	mg/kg/day	1.0E+00	mg/kg/day	7.4E-05
				Arsenic	3.2E+00	mg/kg	2.7E-08	mg/kg/day	1.5E+00	mg/kg/day	4.0E-08	7.8E-08	mg/kg/day	3.0E-04	mg/kg/day	2.6E-04
				Cadmium	7.9E+02	mg/kg	2.2E-07	mg/kg/day	NA		NA	6.4E-07	mg/kg/day	2.5E-05	mg/kg/day	2.6E-02
				Chromium	1.3E+01	mg/kg	3.7E-08	mg/kg/day	2.0E+01	mg/kg/day	7.4E-07	1.1E-07	mg/kg/day	7.5E-05	mg/kg/day	1.4E-03
				Cobalt	3.4E+00	mg/kg	9.6E-09	mg/kg/day	NA		NA	2.8E-08	mg/kg/day	3.0E-04	mg/kg/day	9.3E-05
				Iron	7.5E+03	mg/kg	2.1E-05	mg/kg/day	NA		NA	6.0E-05	mg/kg/day	7.0E-01	mg/kg/day	8.6E-05
			Exp. Route Total								8.3E-07					3.1E-02
		Exposure Point Total									1.7E-06					2.1E-01
	Exposure Medium Total										1.7E-06					2.1E-01
	Air	Emissions from Surface Soil in Waste Area	Inhalation													
				Chromium	9.7E-09	mg/m^3	7.9E-11	mg/m^3	8.4E-02	(ug/m3)$^{-1}$	6.7E-09	2.3E-10	mg/m^3	1.0E-04	mg/m^3	2.3E-06
			Exp. Route Total								6.7E-09					2.3E-06
		Exposure Point Total									6.7E-09					2.3E-06
	Exposure Medium Total										6.7E-09					2.3E-06
Surface Soil In Waste Area											1.7E-06					**2.1E-01**

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil Across Site	Ingestion													
				Benzo(a)anthracene	7.8E-02	mg/kg	5.5E-09	mg/kg/day	7.3E-01	mg/kg/day	4.0E-09	1.6E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	8.9E-02	mg/kg	6.2E-09	mg/kg/day	7.3E+00	mg/kg/day	4.6E-08	1.8E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.1E-02	mg/kg	6.3E-09	mg/kg/day	7.3E-01	mg/kg/day	4.6E-09	1.9E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.9E-02	mg/kg	6.2E-09	mg/kg/day	7.3E-02	mg/kg/day	4.5E-10	1.8E-08	mg/kg/day	NA		NA
				Chrysene	2.6E-01	mg/kg	1.8E-08	mg/kg/day	7.3E-03	mg/kg/day	1.3E-10	5.3E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	3.1E-09	mg/kg/day	7.3E+00	mg/kg/day	2.3E-08	9.2E-09	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	1.0E-08	mg/kg/day	7.3E-01	mg/kg/day	7.6E-09	3.1E-08	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	4.1E-08	mg/kg/day	2.0E+00	mg/kg/day	8.2E-08	1.2E-07	mg/kg/day	2.0E-05	mg/kg/day	6.0E-03
				Aluminum	6.9E+03	mg/kg	4.8E-04	mg/kg/day	NA		NA	1.4E-03	mg/kg/day	1.0E+00	mg/kg/day	1.4E-03
				Arsenic	2.1E+01	mg/kg	1.4E-06	mg/kg/day	1.5E+00	mg/kg/day	2.2E-06	4.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.4E-02
				Cadmium	1.1E+02	mg/kg	8.0E-06	mg/kg/day	NA		NA	2.3E-05	mg/kg/day	1.0E-03	mg/kg/day	2.3E-02
				Chromium	1.0E+01	mg/kg	7.3E-07	mg/kg/day	5.0E-01	mg/kg/day	3.7E-07	2.1E-06	mg/kg/day	3.0E-03	mg/kg/day	7.1E-04
				Cobalt	2.6E+00	mg/kg	1.8E-07	mg/kg/day	NA		NA	5.2E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
				Iron	6.7E+03	mg/kg	4.6E-04	mg/kg/day	NA		NA	1.4E-03	mg/kg/day	7.0E-01	mg/kg/day	1.9E-03
				Manganese	1.0E+02	mg/kg	7.1E-06	mg/kg/day	NA		NA	2.1E-05	mg/kg/day	1.4E-01	mg/kg/day	1.5E-04
				Mercury	5.9E-01	mg/kg	4.1E-08	mg/kg/day	NA		NA	1.2E-07	mg/kg/day	1.0E-04	mg/kg/day	1.2E-03
			Exp. Route Total								2.7E-06					5.0E-02
			Dermal Absorption													
				Benzo(a)anthracene	7.8E-02	mg/kg	2.8E-09	mg/kg/day	7.3E-01	mg/kg/day	2.1E-09	8.3E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	8.9E-02	mg/kg	3.2E-09	mg/kg/day	7.3E+00	mg/kg/day	2.4E-08	9.4E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.1E-02	mg/kg	3.3E-09	mg/kg/day	7.3E-01	mg/kg/day	2.4E-09	9.6E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.9E-02	mg/kg	3.2E-09	mg/kg/day	7.3E-02	mg/kg/day	2.4E-10	9.4E-09	mg/kg/day	NA		NA
				Chrysene	2.6E-01	mg/kg	9.4E-09	mg/kg/day	7.3E-03	mg/kg/day	6.9E-11	2.7E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-09	mg/kg/day	7.3E+00	mg/kg/day	1.2E-08	4.8E-09	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.4E-09	mg/kg/day	7.3E-01	mg/kg/day	4.0E-09	1.6E-08	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	2.3E-08	mg/kg/day	2.0E+00	mg/kg/day	4.6E-08	6.7E-08	mg/kg/day	2.0E-05	mg/kg/day	3.4E-03
				Aluminum	6.9E+03	mg/kg	1.9E-05	mg/kg/day	NA		NA	5.6E-05	mg/kg/day	1.0E+00	mg/kg/day	5.6E-05
				Arsenic	2.1E+01	mg/kg	1.7E-07	mg/kg/day	1.5E+00	mg/kg/day	2.6E-07	5.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
				Cadmium	1.1E+02	mg/kg	3.2E-08	mg/kg/day	NA		NA	9.3E-08	mg/kg/day	2.5E-05	mg/kg/day	3.7E-03
				Chromium	1.0E+01	mg/kg	2.9E-08	mg/kg/day	2.0E+01	mg/kg/day	5.8E-07	8.5E-08	mg/kg/day	7.5E-05	mg/kg/day	1.1E-03
				Cobalt	2.6E+00	mg/kg	7.1E-09	mg/kg/day	NA		NA	2.1E-08	mg/kg/day	3.0E-04	mg/kg/day	6.9E-05
				Iron	6.7E+03	mg/kg	1.9E-05	mg/kg/day	NA		NA	5.4E-05	mg/kg/day	7.0E-01	mg/kg/day	7.7E-05
				Manganese	1.0E+02	mg/kg	2.9E-07	mg/kg/day	NA		NA	8.3E-07	mg/kg/day	1.4E-01	mg/kg/day	5.9E-06
				Mercury	5.9E-01	mg/kg	1.7E-09	mg/kg/day	NA		NA	4.8E-09	mg/kg/day	1.0E-04	mg/kg/day	4.8E-05
			Exp. Route Total								9.3E-07					1.0E-02
		Exposure Point Total									3.6E-06					6.1E-02
	Exposure Medium Total										3.6E-06					6.1E-02
	Air	Emissions from Surface Soil Across Site	Inhalation	Chromium	7.7E-09	mg/m^3	6.3E-11	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	5.3E-09	1.8E-10	mg/m^3	1.0E-04	mg/m^3	1.8E-06
			Exp. Route Total								5.3E-09					1.8E-06
		Exposure Point Total									5.3E-09					1.8E-06
	Exposure Medium Total										5.3E-09					1.8E-06
Surface Soil Across Site											3.6E-06					6.1E-02

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.8E-02	mg/kg	5.5E-09	mg/kg/day	7.3E-01	mg/kg/day	4.0E-09	1.6E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.4E-02	mg/kg	6.5E-09	mg/kg/day	7.3E+00	mg/kg/day	4.8E-08	1.9E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.5E-02	mg/kg	6.7E-09	mg/kg/day	7.3E-01	mg/kg/day	4.9E-09	1.9E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.4E-02	mg/kg	6.6E-09	mg/kg/day	7.3E-02	mg/kg/day	4.8E-10	1.9E-08	mg/kg/day	NA		NA
				Chrysene	9.1E-02	mg/kg	6.4E-09	mg/kg/day	7.3E-03	mg/kg/day	4.6E-11	1.9E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	3.1E-09	mg/kg/day	7.3E+00	mg/kg/day	2.3E-08	9.2E-09	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	1.0E-08	mg/kg/day	7.3E-01	mg/kg/day	7.6E-09	3.1E-08	mg/kg/day	NA		NA
				Aluminum	6.7E+03	mg/kg	4.7E-04	mg/kg/day	NA		NA	1.4E-03	mg/kg/day	1.0E+00	mg/kg/day	1.4E-03
				Arsenic	2.5E+01	mg/kg	1.7E-06	mg/kg/day	1.5E+00	mg/kg/day	2.6E-06	5.0E-06	mg/kg/day	3.0E-04	mg/kg/day	1.7E-02
				Chromium	1.0E+01	mg/kg	7.3E-07	mg/kg/day	5.0E-01	mg/kg/day	3.6E-07	2.1E-06	mg/kg/day	3.0E-03	mg/kg/day	7.1E-04
				Cobalt	2.6E+00	mg/kg	1.8E-07	mg/kg/day	NA		NA	5.2E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
				Iron	6.8E+03	mg/kg	4.7E-04	mg/kg/day	NA		NA	1.4E-03	mg/kg/day	7.0E-01	mg/kg/day	2.0E-03
				Manganese	1.9E+02	mg/kg	1.3E-05	mg/kg/day	NA		NA	3.8E-05	mg/kg/day	1.4E-01	mg/kg/day	2.7E-04
				Mercury	6.7E-01	mg/kg	4.6E-08	mg/kg/day	NA		NA	1.4E-07	mg/kg/day	1.0E-04	mg/kg/day	1.4E-03
			Exp. Route Total								3.0E-06					2.4E-02
			Dermal Absorption													
				Benzo(a)anthracene	7.8E-02	mg/kg	2.8E-09	mg/kg/day	7.3E-01	mg/kg/day	2.1E-09	8.3E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.4E-02	mg/kg	3.4E-09	mg/kg/day	7.3E+00	mg/kg/day	2.5E-08	9.9E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.5E-02	mg/kg	3.5E-09	mg/kg/day	7.3E-01	mg/kg/day	2.5E-09	1.0E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.4E-02	mg/kg	3.4E-09	mg/kg/day	7.3E-02	mg/kg/day	2.5E-10	1.0E-08	mg/kg/day	NA		NA
				Chrysene	9.1E-02	mg/kg	3.3E-09	mg/kg/day	7.3E-03	mg/kg/day	2.4E-11	9.6E-09	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-09	mg/kg/day	7.3E+00	mg/kg/day	1.2E-08	4.8E-09	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.4E-09	mg/kg/day	7.3E-01	mg/kg/day	4.0E-09	1.6E-08	mg/kg/day	NA		NA
				Aluminum	6.7E+03	mg/kg	1.9E-05	mg/kg/day	NA		NA	5.5E-05	mg/kg/day	1.0E+00	mg/kg/day	5.5E-05
				Arsenic	2.5E+01	mg/kg	2.1E-07	mg/kg/day	1.5E+00	mg/kg/day	3.1E-07	6.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.0E-03
				Chromium	1.0E+01	mg/kg	2.9E-08	mg/kg/day	2.0E+01	mg/kg/day	5.8E-07	8.5E-08	mg/kg/day	7.5E-05	mg/kg/day	1.1E-03
				Cobalt	2.6E+00	mg/kg	7.1E-09	mg/kg/day	NA		NA	2.1E-08	mg/kg/day	3.0E-04	mg/kg/day	6.9E-05
				Iron	6.8E+03	mg/kg	1.9E-05	mg/kg/day	NA		NA	5.5E-05	mg/kg/day	7.0E-01	mg/kg/day	7.9E-05
				Manganese	1.9E+02	mg/kg	5.3E-07	mg/kg/day	NA		NA	1.5E-06	mg/kg/day	1.4E-01	mg/kg/day	1.1E-05
				Mercury	6.7E-01	mg/kg	1.9E-09	mg/kg/day	NA		NA	5.4E-09	mg/kg/day	1.0E-04	mg/kg/day	5.4E-05
			Exp. Route Total								9.3E-07					3.4E-03
		Exposure Point Total									4.0E-06					2.8E-02
	Exposure Medium Total										4.0E-06					2.8E-02
	Air	Emissions from Surface Soil Outside Waste Area	Inhalation	Chromium	7.7E-09	mg/m^3	6.2E-11	mg/m^3	8.4E-02	(ug/m3)$^{-1}$	5.2E-09	1.8E-10	mg/m^3	1.0E-04	mg/m^3	1.8E-06
			Exp. Route Total								5.2E-09					1.8E-06
		Exposure Point Total									5.2E-09					1.8E-06
	Exposure Medium Total										5.2E-09					1.8E-06
Surface Soil Outside Waste Area											**4.0E-06**					2.8E-02

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* in Sludge Area	Ingestion													
				Chromium	6.9E+00	mg/kg	4.8E-07	mg/kg/day	5.0E-01	mg/kg/day	2.4E-07	1.4E-06	mg/kg/day	3.0E-03	mg/kg/day	4.7E-04
				Cobalt	8.7E+00	mg/kg	6.1E-07	mg/kg/day	NA		NA	1.8E-06	mg/kg/day	3.0E-04	mg/kg/day	5.9E-03
				Iron	5.8E+03	mg/kg	4.1E-04	mg/kg/day	NA		NA	1.2E-03	mg/kg/day	7.0E-01	mg/kg/day	1.7E-03
				Manganese	2.5E+02	mg/kg	1.7E-05	mg/kg/day	NA		NA	5.0E-05	mg/kg/day	1.4E-01	mg/kg/day	3.6E-04
			Exp. Route Total								2.4E-07					8.4E-03
			Dermal Absorption													
				Chromium	6.9E+00	mg/kg	1.9E-08	mg/kg/day	2.0E+01	mg/kg/day	3.8E-07	5.6E-08	mg/kg/day	7.5E-05	mg/kg/day	7.5E-04
				Cobalt	8.7E+00	mg/kg	2.4E-08	mg/kg/day	NA		NA	7.1E-08	mg/kg/day	3.0E-04	mg/kg/day	2.4E-04
				Iron	5.8E+03	mg/kg	1.6E-05	mg/kg/day	NA		NA	4.7E-05	mg/kg/day	7.0E-01	mg/kg/day	6.8E-05
				Manganese	2.5E+02	mg/kg	6.8E-07	mg/kg/day	NA		NA	2.0E-06	mg/kg/day	1.4E-01	mg/kg/day	1.4E-05
			Exp. Route Total								3.8E-07					1.1E-03
		Exposure Point Total									6.2E-07					9.5E-03
	Exposure Medium Total										6.2E-07					9.5E-03
Soil* in Sludge Area											6.2E-07					9.5E-03
										Total of Receptor Risks Across All Media	4.0E-06				Total of Receptor Hazards Across All Media	2.1E-01

Notes-

NA = Not applicable.

bold indicates soil area with greatest risk or hazard index

Total is maximum of surface soil in waste area, outside waste area, or across site, or soil in sludge area.

Soil* indicates combined surface and subsurface soil.

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil in Waste Area	Ingestion													
				Benzo(a)pyrene	4.0E-02	mg/kg	1.4E-09	mg/kg/day	7.3E+00	mg/kg/day	1.0E-08	1.1E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	3.8E-02	mg/kg	1.4E-09	mg/kg/day	7.3E-01	mg/kg/day	1.0E-09	1.1E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	2.9E-02	mg/kg	1.0E-09	mg/kg/day	7.3E-02	mg/kg/day	7.6E-11	8.1E-09	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	2.1E-08	mg/kg/day	2.0E+00	mg/kg/day	4.2E-08	1.6E-07	mg/kg/day	2.0E-05	mg/kg/day	8.2E-03
				Aluminum	9.1E+03	mg/kg	3.3E-04	mg/kg/day	NA		NA	2.5E-03	mg/kg/day	1.0E+00	mg/kg/day	2.5E-03
				Arsenic	3.2E+00	mg/kg	1.2E-07	mg/kg/day	1.5E+00	mg/kg/day	1.7E-07	9.0E-07	mg/kg/day	3.0E-04	mg/kg/day	3.0E-03
				Cadmium	7.9E+02	mg/kg	2.8E-05	mg/kg/day	NA		NA	2.2E-04	mg/kg/day	1.0E-03	mg/kg/day	2.2E-01
				Chromium	1.3E+01	mg/kg	4.8E-07	mg/kg/day	5.0E-01	mg/kg/day	2.4E-07	3.7E-06	mg/kg/day	3.0E-03	mg/kg/day	1.2E-03
				Cobalt	3.4E+00	mg/kg	1.2E-07	mg/kg/day	NA		NA	9.6E-07	mg/kg/day	3.0E-04	mg/kg/day	3.2E-03
				Iron	7.5E+03	mg/kg	2.7E-04	mg/kg/day	NA		NA	2.1E-03	mg/kg/day	7.0E-01	mg/kg/day	3.0E-03
			Exp. Route Total								4.6E-07					2.4E-01
			Dermal Absorption													
				Benzo(a)pyrene	4.0E-02	mg/kg	2.1E-09	mg/kg/day	7.3E+00	mg/kg/day	1.6E-08	1.7E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	3.8E-02	mg/kg	2.0E-09	mg/kg/day	7.3E-01	mg/kg/day	1.5E-09	1.6E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	2.9E-02	mg/kg	1.5E-09	mg/kg/day	7.3E-02	mg/kg/day	1.1E-10	1.2E-08	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	3.4E-08	mg/kg/day	2.0E+00	mg/kg/day	6.8E-08	2.6E-07	mg/kg/day	2.0E-05	mg/kg/day	1.3E-02
				Aluminum	9.1E+03	mg/kg	3.7E-05	mg/kg/day	NA		NA	2.9E-04	mg/kg/day	1.0E+00	mg/kg/day	2.9E-04
				Arsenic	3.2E+00	mg/kg	3.9E-08	mg/kg/day	1.5E+00	mg/kg/day	5.9E-08	3.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.0E-03
				Cadmium	7.9E+02	mg/kg	3.2E-07	mg/kg/day	NA		NA	2.5E-06	mg/kg/day	2.5E-05	mg/kg/day	1.0E-01
				Chromium	1.3E+01	mg/kg	5.4E-08	mg/kg/day	2.0E+01	mg/kg/day	1.1E-06	4.2E-07	mg/kg/day	7.5E-05	mg/kg/day	5.6E-03
				Cobalt	3.4E+00	mg/kg	1.4E-08	mg/kg/day	NA		NA	1.1E-07	mg/kg/day	3.0E-04	mg/kg/day	3.7E-04
				Iron	7.5E+03	mg/kg	3.1E-05	mg/kg/day	NA		NA	2.4E-04	mg/kg/day	7.0E-01	mg/kg/day	3.4E-04
			Exp. Route Total								1.2E-06					1.2E-01
		Exposure Point Total									1.7E-06					3.6E-01
	Exposure Medium Total										1.7E-06					3.6E-01
	Air	Emissions from Surface Soil in Waste Area	Inhalation	Chromium	9.7E-09	mg/m^3	3.0E-11	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	2.5E-09	2.3E-10	mg/m^3	1.0E-04	mg/m^3	2.3E-06
			Exp. Route Total								2.5E-09					2.3E-06
		Exposure Point Total									2.5E-09					2.3E-06
	Exposure Medium Total										2.5E-09					2.3E-06
Surface Soil In Waste Area											1.7E-06					**3.6E-01**

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil Across Site	Ingestion													
				Benzo(a)anthracene	7.8E-02	mg/kg	2.8E-09	mg/kg/day	7.3E-01	mg/kg/day	2.1E-09	2.2E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	8.9E-02	mg/kg	3.2E-09	mg/kg/day	7.3E+00	mg/kg/day	2.3E-08	2.5E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.1E-02	mg/kg	3.3E-09	mg/kg/day	7.3E-01	mg/kg/day	2.4E-09	2.5E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.9E-02	mg/kg	3.2E-09	mg/kg/day	7.3E-02	mg/kg/day	2.3E-10	2.5E-08	mg/kg/day	NA		NA
				Chrysene	2.6E-01	mg/kg	9.3E-09	mg/kg/day	7.3E-03	mg/kg/day	6.8E-11	7.3E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-09	mg/kg/day	7.3E+00	mg/kg/day	1.2E-08	1.3E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.4E-09	mg/kg/day	7.3E-01	mg/kg/day	3.9E-09	4.2E-08	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	2.1E-08	mg/kg/day	2.0E+00	mg/kg/day	4.2E-08	1.6E-07	mg/kg/day	2.0E-05	mg/kg/day	8.2E-03
				Aluminum	6.9E+03	mg/kg	2.5E-04	mg/kg/day	NA		NA	1.9E-03	mg/kg/day	1.0E+00	mg/kg/day	1.9E-03
				Arsenic	2.1E+01	mg/kg	7.4E-07	mg/kg/day	1.5E+00	mg/kg/day	1.1E-06	5.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.9E-02
				Cadmium	1.1E+02	mg/kg	4.1E-06	mg/kg/day	NA		NA	3.2E-05	mg/kg/day	1.0E-03	mg/kg/day	3.2E-02
				Chromium	1.0E+01	mg/kg	3.8E-07	mg/kg/day	5.0E-01	mg/kg/day	1.9E-07	2.9E-06	mg/kg/day	3.0E-03	mg/kg/day	9.8E-04
				Cobalt	2.6E+00	mg/kg	9.2E-08	mg/kg/day	NA		NA	7.2E-07	mg/kg/day	3.0E-04	mg/kg/day	2.4E-03
				Iron	6.7E+03	mg/kg	2.4E-04	mg/kg/day	NA		NA	1.9E-03	mg/kg/day	7.0E-01	mg/kg/day	2.7E-03
				Manganese	1.0E+02	mg/kg	3.7E-06	mg/kg/day	NA		NA	2.9E-05	mg/kg/day	1.4E-01	mg/kg/day	2.0E-04
				Mercury	5.9E-01	mg/kg	2.1E-08	mg/kg/day	NA		NA	1.7E-07	mg/kg/day	1.0E-04	mg/kg/day	1.7E-03
			Exp. Route Total								1.4E-06					6.9E-02
			Dermal Absorption													
				Benzo(a)anthracene	7.8E-02	mg/kg	4.2E-09	mg/kg/day	7.3E-01	mg/kg/day	3.0E-09	3.2E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	8.9E-02	mg/kg	4.8E-09	mg/kg/day	7.3E+00	mg/kg/day	3.5E-08	3.7E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.1E-02	mg/kg	4.8E-09	mg/kg/day	7.3E-01	mg/kg/day	3.5E-09	3.8E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.9E-02	mg/kg	4.8E-09	mg/kg/day	7.3E-02	mg/kg/day	3.5E-10	3.7E-08	mg/kg/day	NA		NA
				Chrysene	2.6E-01	mg/kg	1.4E-08	mg/kg/day	7.3E-03	mg/kg/day	1.0E-10	1.1E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	2.4E-09	mg/kg/day	7.3E+00	mg/kg/day	1.7E-08	1.9E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	8.0E-09	mg/kg/day	7.3E-01	mg/kg/day	5.8E-09	6.2E-08	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	3.4E-08	mg/kg/day	2.0E+00	mg/kg/day	6.8E-08	2.6E-07	mg/kg/day	2.0E-05	mg/kg/day	1.3E-02
				Aluminum	6.9E+03	mg/kg	2.8E-05	mg/kg/day	NA		NA	2.2E-04	mg/kg/day	1.0E+00	mg/kg/day	2.2E-04
				Arsenic	2.1E+01	mg/kg	2.5E-07	mg/kg/day	1.5E+00	mg/kg/day	3.8E-07	2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	6.6E-03
				Cadmium	1.1E+02	mg/kg	4.7E-08	mg/kg/day	NA		NA	3.7E-07	mg/kg/day	2.5E-05	mg/kg/day	1.5E-02
				Chromium	1.0E+01	mg/kg	4.3E-08	mg/kg/day	2.0E+01	mg/kg/day	8.6E-07	3.3E-07	mg/kg/day	7.5E-05	mg/kg/day	4.5E-03
				Cobalt	2.6E+00	mg/kg	1.0E-08	mg/kg/day	NA		NA	8.2E-08	mg/kg/day	3.0E-04	mg/kg/day	2.7E-04
				Iron	6.7E+03	mg/kg	2.7E-05	mg/kg/day	NA		NA	2.1E-04	mg/kg/day	7.0E-01	mg/kg/day	3.0E-04
				Manganese	1.0E+02	mg/kg	4.2E-07	mg/kg/day	NA		NA	3.3E-06	mg/kg/day	1.4E-01	mg/kg/day	2.3E-05
				Mercury	5.9E-01	mg/kg	2.4E-09	mg/kg/day	NA		NA	1.9E-08	mg/kg/day	1.0E-04	mg/kg/day	1.9E-04
			Exp. Route Total								1.4E-06					4.0E-02
		Exposure Point Total									2.8E-06					1.1E-01
	Exposure Medium Total										2.8E-06					1.1E-01
	Air	Emissions from Surface Soil Across Site	Inhalation	Chromium	7.7E-09	mg/m^3	2.4E-11	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	2.0E-09	1.8E-10	mg/m^3	1.0E-04	mg/m^3	1.8E-06
			Exp. Route Total								2.0E-09					1.8E-06
		Exposure Point Total									2.0E-09					1.8E-06
	Exposure Medium Total										2.0E-09					1.8E-06
Surface Soil Across Site											2.8E-06					1.1E-01

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.8E-02	mg/kg	2.8E-09	mg/kg/day	7.3E-01	mg/kg/day	2.1E-09	2.2E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.4E-02	mg/kg	3.4E-09	mg/kg/day	7.3E+00	mg/kg/day	2.5E-08	2.6E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.5E-02	mg/kg	3.4E-09	mg/kg/day	7.3E-01	mg/kg/day	2.5E-09	2.7E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.4E-02	mg/kg	3.4E-09	mg/kg/day	7.3E-02	mg/kg/day	2.5E-10	2.6E-08	mg/kg/day	NA		NA
				Chrysene	9.1E-02	mg/kg	3.3E-09	mg/kg/day	7.3E-03	mg/kg/day	2.4E-11	2.5E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-09	mg/kg/day	7.3E+00	mg/kg/day	1.2E-08	1.3E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.4E-09	mg/kg/day	7.3E-01	mg/kg/day	3.9E-09	4.2E-08	mg/kg/day	NA		NA
				Aluminum	6.7E+03	mg/kg	2.4E-04	mg/kg/day	NA		NA	1.9E-03	mg/kg/day	1.0E+00	mg/kg/day	1.9E-03
				Arsenic	2.5E+01	mg/kg	8.9E-07	mg/kg/day	1.5E+00	mg/kg/day	1.3E-06	6.9E-06	mg/kg/day	3.0E-04	mg/kg/day	2.3E-02
				Chromium	1.0E+01	mg/kg	3.7E-07	mg/kg/day	5.0E-01	mg/kg/day	1.9E-07	2.9E-06	mg/kg/day	3.0E-03	mg/kg/day	9.7E-04
				Cobalt	2.6E+00	mg/kg	9.2E-08	mg/kg/day	NA		NA	7.1E-07	mg/kg/day	3.0E-04	mg/kg/day	2.4E-03
				Iron	6.8E+03	mg/kg	2.4E-04	mg/kg/day	NA		NA	1.9E-03	mg/kg/day	7.0E-01	mg/kg/day	2.7E-03
				Manganese	1.9E+02	mg/kg	6.8E-06	mg/kg/day	NA		NA	5.3E-05	mg/kg/day	1.4E-01	mg/kg/day	3.8E-04
				Mercury	6.7E-01	mg/kg	2.4E-08	mg/kg/day	NA		NA	1.9E-07	mg/kg/day	1.0E-04	mg/kg/day	1.9E-03
			Exp. Route Total								1.6E-06					3.3E-02
			Dermal Absorption													
				Benzo(a)anthracene	7.8E-02	mg/kg	4.2E-09	mg/kg/day	7.3E-01	mg/kg/day	3.0E-09	3.2E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.4E-02	mg/kg	5.0E-09	mg/kg/day	7.3E+00	mg/kg/day	3.6E-08	3.9E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.5E-02	mg/kg	5.1E-09	mg/kg/day	7.3E-01	mg/kg/day	3.7E-09	4.0E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.4E-02	mg/kg	5.0E-09	mg/kg/day	7.3E-02	mg/kg/day	3.7E-10	3.9E-08	mg/kg/day	NA		NA
				Chrysene	9.1E-02	mg/kg	4.9E-09	mg/kg/day	7.3E-03	mg/kg/day	3.5E-11	3.8E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	2.4E-09	mg/kg/day	7.3E+00	mg/kg/day	1.7E-08	1.9E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	8.0E-09	mg/kg/day	7.3E-01	mg/kg/day	5.8E-09	6.2E-08	mg/kg/day	NA		NA
				Aluminum	6.7E+03	mg/kg	2.8E-05	mg/kg/day	NA		NA	2.1E-04	mg/kg/day	1.0E+00	mg/kg/day	2.1E-04
				Arsenic	2.5E+01	mg/kg	3.0E-07	mg/kg/day	1.5E+00	mg/kg/day	4.5E-07	2.4E-06	mg/kg/day	3.0E-04	mg/kg/day	7.8E-03
				Chromium	1.0E+01	mg/kg	4.3E-08	mg/kg/day	2.0E+01	mg/kg/day	8.5E-07	3.3E-07	mg/kg/day	7.5E-05	mg/kg/day	4.4E-03
				Cobalt	2.6E+00	mg/kg	1.0E-08	mg/kg/day	NA		NA	8.1E-08	mg/kg/day	3.0E-04	mg/kg/day	2.7E-04
				Iron	6.8E+03	mg/kg	2.8E-05	mg/kg/day	NA		NA	2.2E-04	mg/kg/day	7.0E-01	mg/kg/day	3.1E-04
				Manganese	1.9E+02	mg/kg	7.7E-07	mg/kg/day	NA		NA	6.0E-06	mg/kg/day	1.4E-01	mg/kg/day	4.3E-05
				Mercury	6.7E-01	mg/kg	2.7E-09	mg/kg/day	NA		NA	2.1E-08	mg/kg/day	1.0E-04	mg/kg/day	2.1E-04
			Exp. Route Total								1.4E-06					1.3E-02
		Exposure Point Total									2.9E-06					4.6E-02
	Exposure Medium Total										2.9E-06					4.6E-02
	Air	Emissions from Surface Soil Outside Waste Area	Inhalation	Chromium	7.7E-09	mg/m^3	2.3E-11	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	2.0E-09	1.8E-10	mg/m^3	1.0E-04	mg/m^3	1.8E-06
			Exp. Route Total								2.0E-09					1.8E-06
		Exposure Point Total									2.0E-09					1.8E-06
	Exposure Medium Total										2.0E-09					1.8E-06
Surface Soil Outside Waste Area											**2.9E-06**					4.6E-02

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* in Sludge Area	Ingestion	Chromium	6.9E+00	mg/kg	2.5E-07	mg/kg/day	5.0E-01	mg/kg/day	1.2E-07	1.9E-06	mg/kg/day	3.0E-03	mg/kg/day	6.4E-04
				Cobalt	8.7E+00	mg/kg	3.1E-07	mg/kg/day	NA		NA	2.4E-06	mg/kg/day	3.0E-04	mg/kg/day	8.1E-03
				Iron	5.8E+03	mg/kg	2.1E-04	mg/kg/day	NA		NA	1.6E-03	mg/kg/day	7.0E-01	mg/kg/day	2.3E-03
				Manganese	2.5E+02	mg/kg	8.8E-06	mg/kg/day	NA		NA	6.8E-05	mg/kg/day	1.4E-01	mg/kg/day	4.9E-04
			Exp. Route Total								1.2E-07					1.2E-02
			Dermal Absorption	Chromium	6.9E+00	mg/kg	2.8E-08	mg/kg/day	2.0E+01	mg/kg/day	5.7E-07	2.2E-07	mg/kg/day	7.5E-05	mg/kg/day	2.9E-03
				Cobalt	8.7E+00	mg/kg	3.6E-08	mg/kg/day	NA		NA	2.8E-07	mg/kg/day	3.0E-04	mg/kg/day	9.2E-04
				Iron	5.8E+03	mg/kg	2.4E-05	mg/kg/day	NA		NA	1.9E-04	mg/kg/day	7.0E-01	mg/kg/day	2.6E-04
				Manganese	2.5E+02	mg/kg	1.0E-06	mg/kg/day	NA		NA	7.8E-06	mg/kg/day	1.4E-01	mg/kg/day	5.6E-05
			Exp. Route Total								5.7E-07					4.2E-03
		Exposure Point Total									6.9E-07					1.6E-02
	Exposure Medium Total										6.9E-07					1.6E-02
Soil* in Sludge Area											6.9E-07					1.6E-02
										Total of Receptor Risks Across All Media	2.9E-06				Total of Receptor Hazards Across All Media	3.6E-01

Notes-

bold indicates soil area with greatest risk or hazard index

NA = Not applicable.

Total is maximum of surface soil in waste area, outside waste area, or across site, or soil in sludge area.

Soil* indicates combined surface and subsurface soil.

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil in Waste Area	Ingestion													
				Benzo(a)pyrene	4.0E-02	mg/kg	1.4E-08	mg/kg/day	7.3E+00	mg/kg/day	1.0E-07	3.9E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	3.8E-02	mg/kg	1.3E-08	mg/kg/day	7.3E-01	mg/kg/day	9.7E-09	3.7E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	2.9E-02	mg/kg	1.0E-08	mg/kg/day	7.3E-02	mg/kg/day	7.4E-10	2.8E-08	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	2.1E-07	mg/kg/day	2.0E+00	mg/kg/day	4.1E-07	5.8E-07	mg/kg/day	2.0E-05	mg/kg/day	2.9E-02
				Aluminum	9.1E+03	mg/kg	3.2E-03	mg/kg/day	NA		NA	8.9E-03	mg/kg/day	1.0E+00	mg/kg/day	8.9E-03
				Arsenic	3.2E+00	mg/kg	1.1E-06	mg/kg/day	1.5E+00	mg/kg/day	1.7E-06	3.1E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Cadmium	7.9E+02	mg/kg	2.7E-04	mg/kg/day	NA		NA	7.7E-04	mg/kg/day	1.0E-03	mg/kg/day	7.7E-01
				Chromium	1.3E+01	mg/kg	4.6E-06	mg/kg/day	5.0E-01	mg/kg/day	2.3E-06	1.3E-05	mg/kg/day	3.0E-03	mg/kg/day	4.3E-03
				Cobalt	3.4E+00	mg/kg	1.2E-06	mg/kg/day	NA		NA	3.4E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Iron	7.5E+03	mg/kg	2.6E-03	mg/kg/day	NA		NA	7.3E-03	mg/kg/day	7.0E-01	mg/kg/day	1.0E-02
			Exp. Route Total								4.5E-06					8.4E-01
			Dermal Absorption													
				Benzo(a)pyrene	4.0E-02	mg/kg	1.2E-08	mg/kg/day	7.3E+00	mg/kg/day	8.8E-08	3.4E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	3.8E-02	mg/kg	1.1E-08	mg/kg/day	7.3E-01	mg/kg/day	8.3E-09	3.2E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	2.9E-02	mg/kg	8.7E-09	mg/kg/day	7.3E-02	mg/kg/day	6.3E-10	2.4E-08	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	1.9E-07	mg/kg/day	2.0E+00	mg/kg/day	3.8E-07	5.3E-07	mg/kg/day	2.0E-05	mg/kg/day	2.7E-02
				Aluminum	9.1E+03	mg/kg	2.1E-04	mg/kg/day	NA		NA	5.9E-04	mg/kg/day	1.0E+00	mg/kg/day	5.9E-04
				Arsenic	3.2E+00	mg/kg	2.2E-07	mg/kg/day	1.5E+00	mg/kg/day	3.3E-07	6.2E-07	mg/kg/day	3.0E-04	mg/kg/day	2.1E-03
				Cadmium	7.9E+02	mg/kg	1.8E-06	mg/kg/day	NA		NA	5.1E-06	mg/kg/day	2.5E-05	mg/kg/day	2.0E-01
				Chromium	1.3E+01	mg/kg	3.1E-07	mg/kg/day	2.0E+01	mg/kg/day	6.1E-06	8.5E-07	mg/kg/day	7.5E-05	mg/kg/day	1.1E-02
				Cobalt	3.4E+00	mg/kg	8.0E-08	mg/kg/day	NA		NA	2.2E-07	mg/kg/day	3.0E-04	mg/kg/day	7.4E-04
				Iron	7.5E+03	mg/kg	1.7E-04	mg/kg/day	NA		NA	4.8E-04	mg/kg/day	7.0E-01	mg/kg/day	6.9E-04
			Exp. Route Total								6.9E-06					2.5E-01
		Exposure Point Total									1.1E-05					1.1E+00
	Exposure Medium Total										1.1E-05					1.1E+00
	Air	Emissions from Surface Soil in Waste Area	Inhalation	Chromium	9.7E-09	mg/m^3	7.9E-10	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	6.7E-08	2.2E-09	mg/m^3	1.0E-04	mg/kg/day	2.2E-05
			Exp. Route Total								6.7E-08					2.2E-05
		Exposure Point Total									6.7E-08					2.2E-05
	Exposure Medium Total										6.7E-08					2.2E-05
Surface Soil In Waste Area											1.1E-05					**1.1E+00**

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil Across Site	Ingestion													
				Benzo(a)anthracene	7.8E-02	mg/kg	2.7E-08	mg/kg/day	7.3E-01	mg/kg/day	2.0E-08	7.7E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	8.9E-02	mg/kg	3.1E-08	mg/kg/day	7.3E+00	mg/kg/day	2.3E-07	8.8E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.1E-02	mg/kg	3.2E-08	mg/kg/day	7.3E-01	mg/kg/day	2.3E-08	8.9E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.9E-02	mg/kg	3.1E-08	mg/kg/day	7.3E-02	mg/kg/day	2.3E-09	8.7E-08	mg/kg/day	NA		NA
				Chrysene	2.6E-01	mg/kg	9.1E-08	mg/kg/day	7.3E-03	mg/kg/day	6.6E-10	2.5E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-08	mg/kg/day	7.3E+00	mg/kg/day	1.1E-07	4.4E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.2E-08	mg/kg/day	7.3E-01	mg/kg/day	3.8E-08	1.5E-07	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	2.1E-07	mg/kg/day	2.0E+00	mg/kg/day	4.1E-07	5.8E-07	mg/kg/day	2.0E-05	mg/kg/day	2.9E-02
				Aluminum	6.9E+03	mg/kg	2.4E-03	mg/kg/day	NA		NA	6.8E-03	mg/kg/day	1.0E+00	mg/kg/day	6.8E-03
				Arsenic	2.1E+01	mg/kg	7.2E-06	mg/kg/day	1.5E+00	mg/kg/day	1.1E-05	2.0E-05	mg/kg/day	3.0E-04	mg/kg/day	6.7E-02
				Cadmium	1.1E+02	mg/kg	4.0E-05	mg/kg/day	NA		NA	1.1E-04	mg/kg/day	1.0E-03	mg/kg/day	1.1E-01
				Chromium	1.0E+01	mg/kg	3.7E-06	mg/kg/day	5.0E-01	mg/kg/day	1.8E-06	1.0E-05	mg/kg/day	3.0E-03	mg/kg/day	3.4E-03
				Cobalt	2.6E+00	mg/kg	8.9E-07	mg/kg/day	NA		NA	2.5E-06	mg/kg/day	3.0E-04	mg/kg/day	8.4E-03
				Iron	6.7E+03	mg/kg	2.3E-03	mg/kg/day	NA		NA	6.5E-03	mg/kg/day	7.0E-01	mg/kg/day	9.3E-03
				Manganese	1.0E+02	mg/kg	3.6E-05	mg/kg/day	NA		NA	1.0E-04	mg/kg/day	1.4E-01	mg/kg/day	7.2E-04
				Mercury	5.9E-01	mg/kg	2.1E-07	mg/kg/day	NA		NA	5.8E-07	mg/kg/day	1.0E-04	mg/kg/day	5.8E-03
			Exp. Route Total								1.3E-05					2.4E-01
			Dermal Absorption													
				Benzo(a)anthracene	7.8E-02	mg/kg	2.4E-08	mg/kg/day	7.3E-01	mg/kg/day	1.7E-08	6.6E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	8.9E-02	mg/kg	2.7E-08	mg/kg/day	7.3E+00	mg/kg/day	2.0E-07	7.5E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.1E-02	mg/kg	2.7E-08	mg/kg/day	7.3E-01	mg/kg/day	2.0E-08	7.6E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.9E-02	mg/kg	2.7E-08	mg/kg/day	7.3E-02	mg/kg/day	2.0E-09	7.5E-08	mg/kg/day	NA		NA
				Chrysene	2.6E-01	mg/kg	7.8E-08	mg/kg/day	7.3E-03	mg/kg/day	5.7E-10	2.2E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.3E-08	mg/kg/day	7.3E+00	mg/kg/day	9.8E-08	3.8E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	4.5E-08	mg/kg/day	7.3E-01	mg/kg/day	3.3E-08	1.3E-07	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	1.9E-07	mg/kg/day	2.0E+00	mg/kg/day	3.8E-07	5.3E-07	mg/kg/day	2.0E-05	mg/kg/day	2.7E-02
				Aluminum	6.9E+03	mg/kg	1.6E-04	mg/kg/day	NA		NA	4.5E-04	mg/kg/day	1.0E+00	mg/kg/day	4.5E-04
				Arsenic	2.1E+01	mg/kg	1.4E-06	mg/kg/day	1.5E+00	mg/kg/day	2.1E-06	4.0E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Cadmium	1.1E+02	mg/kg	2.6E-07	mg/kg/day	NA		NA	7.4E-07	mg/kg/day	2.5E-05	mg/kg/day	3.0E-02
				Chromium	1.0E+01	mg/kg	2.4E-07	mg/kg/day	2.0E+01	mg/kg/day	4.8E-06	6.8E-07	mg/kg/day	7.5E-05	mg/kg/day	9.0E-03
				Cobalt	2.6E+00	mg/kg	5.9E-08	mg/kg/day	NA		NA	1.7E-07	mg/kg/day	3.0E-04	mg/kg/day	5.5E-04
				Iron	6.7E+03	mg/kg	1.5E-04	mg/kg/day	NA		NA	4.3E-04	mg/kg/day	7.0E-01	mg/kg/day	6.1E-04
				Manganese	1.0E+02	mg/kg	2.4E-06	mg/kg/day	NA		NA	6.6E-06	mg/kg/day	1.4E-01	mg/kg/day	4.7E-05
				Mercury	5.9E-01	mg/kg	1.4E-08	mg/kg/day	NA		NA	3.8E-08	mg/kg/day	1.0E-04	mg/kg/day	3.8E-04
			Exp. Route Total								7.7E-06					8.1E-02
		Exposure Point Total									2.1E-05					3.2E-01
	Exposure Medium Total										2.1E-05					3.2E-01
	Air	Emissions from Surface Soil Across Site	Inhalation	Chromium	7.7E-09	mg/m^3	6.3E-10	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	5.3E-08	1.8E-09	mg/m^3	1.0E-04	mg/kg/day	1.8E-05
			Exp. Route Total								5.3E-08					1.8E-05
		Exposure Point Total									5.3E-08					1.8E-05
	Exposure Medium Total										5.3E-08					1.8E-05
Surface Soil Across Site											2.1E-05					3.2E-01

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.8E-02	mg/kg	2.7E-08	mg/kg/day	7.3E-01	mg/kg/day	2.0E-08	7.7E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.4E-02	mg/kg	3.3E-08	mg/kg/day	7.3E+00	mg/kg/day	2.4E-07	9.2E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.5E-02	mg/kg	3.3E-08	mg/kg/day	7.3E-01	mg/kg/day	2.4E-08	9.3E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.4E-02	mg/kg	3.3E-08	mg/kg/day	7.3E-02	mg/kg/day	2.4E-09	9.2E-08	mg/kg/day	NA		NA
				Chrysene	9.1E-02	mg/kg	3.2E-08	mg/kg/day	7.3E-03	mg/kg/day	2.3E-10	8.9E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-08	mg/kg/day	7.3E+00	mg/kg/day	1.1E-07	4.4E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.2E-08	mg/kg/day	7.3E-01	mg/kg/day	3.8E-08	1.5E-07	mg/kg/day	NA		NA
				Aluminum	6.7E+03	mg/kg	2.3E-03	mg/kg/day	NA		NA	6.6E-03	mg/kg/day	1.0E+00	mg/kg/day	6.6E-03
				Arsenic	2.5E+01	mg/kg	8.6E-06	mg/kg/day	1.5E+00	mg/kg/day	1.3E-05	2.4E-05	mg/kg/day	3.0E-04	mg/kg/day	8.0E-02
				Chromium	1.0E+01	mg/kg	3.6E-06	mg/kg/day	5.0E-01	mg/kg/day	1.8E-06	1.0E-05	mg/kg/day	3.0E-03	mg/kg/day	3.4E-03
				Cobalt	2.6E+00	mg/kg	8.9E-07	mg/kg/day	NA		NA	2.5E-06	mg/kg/day	3.0E-04	mg/kg/day	8.3E-03
				Iron	6.8E+03	mg/kg	2.4E-03	mg/kg/day	NA		NA	6.7E-03	mg/kg/day	7.0E-01	mg/kg/day	9.5E-03
				Manganese	1.9E+02	mg/kg	6.6E-05	mg/kg/day	NA		NA	1.9E-04	mg/kg/day	1.4E-01	mg/kg/day	1.3E-03
				Mercury	6.7E-01	mg/kg	2.3E-07	mg/kg/day	NA		NA	6.5E-07	mg/kg/day	1.0E-04	mg/kg/day	6.5E-03
			Exp. Route Total								1.5E-05					1.2E-01
			Dermal Absorption													
				Benzo(a)anthracene	7.8E-02	mg/kg	2.4E-08	mg/kg/day	7.3E-01	mg/kg/day	1.7E-08	6.6E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.4E-02	mg/kg	2.8E-08	mg/kg/day	7.3E+00	mg/kg/day	2.0E-07	7.9E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.5E-02	mg/kg	2.9E-08	mg/kg/day	7.3E-01	mg/kg/day	2.1E-08	8.0E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.4E-02	mg/kg	2.8E-08	mg/kg/day	7.3E-02	mg/kg/day	2.1E-09	7.9E-08	mg/kg/day	NA		NA
				Chrysene	9.1E-02	mg/kg	2.7E-08	mg/kg/day	7.3E-03	mg/kg/day	2.0E-10	7.7E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.3E-08	mg/kg/day	7.3E+00	mg/kg/day	9.8E-08	3.8E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	4.5E-08	mg/kg/day	7.3E-01	mg/kg/day	3.3E-08	1.3E-07	mg/kg/day	NA		NA
				Aluminum	6.7E+03	mg/kg	1.6E-04	mg/kg/day	NA		NA	4.3E-04	mg/kg/day	1.0E+00	mg/kg/day	4.3E-04
				Arsenic	2.5E+01	mg/kg	1.7E-06	mg/kg/day	1.5E+00	mg/kg/day	2.6E-06	4.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.6E-02
				Chromium	1.0E+01	mg/kg	2.4E-07	mg/kg/day	2.0E+01	mg/kg/day	4.8E-06	6.7E-07	mg/kg/day	7.5E-05	mg/kg/day	9.0E-03
				Cobalt	2.6E+00	mg/kg	5.9E-08	mg/kg/day	NA		NA	1.7E-07	mg/kg/day	3.0E-04	mg/kg/day	5.5E-04
				Iron	6.8E+03	mg/kg	1.6E-04	mg/kg/day	NA		NA	4.4E-04	mg/kg/day	7.0E-01	mg/kg/day	6.3E-04
				Manganese	1.9E+02	mg/kg	4.4E-06	mg/kg/day	NA		NA	1.2E-05	mg/kg/day	1.4E-01	mg/kg/day	8.7E-05
				Mercury	6.7E-01	mg/kg	1.5E-08	mg/kg/day	NA		NA	4.3E-08	mg/kg/day	1.0E-04	mg/kg/day	4.3E-04
			Exp. Route Total								7.7E-06					2.7E-02
		Exposure Point Total									2.3E-05					1.4E-01
	Exposure Medium Total										2.3E-05					1.4E-01
	Air	Emissions from Surface Soil Outside Waste Area	Inhalation	Chromium	7.7E-09	mg/m^3	6.2E-10	mg/m^3	8.4E-02	(ug/m3)$^{-1}$	5.2E-08	1.7E-09	mg/m^3	1.0E-04	mg/m^3	1.7E-05
			Exp. Route Total								5.2E-08					1.7E-05
		Exposure Point Total									5.2E-08					1.7E-05
	Exposure Medium Total										5.2E-08					1.7E-05
Surface Soil Outside Waste Area											**2.3E-05**					1.4E-01

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Sludge Area	Ingestion	Chromium	6.9E+00	mg/kg	2.4E-06	mg/kg/day	5.0E-01	mg/kg/day	1.2E-06	6.8E-06	mg/kg/day	3.0E-03	mg/kg/day	2.3E-03
				Cobalt	8.7E+00	mg/kg	3.0E-06	mg/kg/day	NA		NA	8.5E-06	mg/kg/day	3.0E-04	mg/kg/day	2.8E-02
				Iron	5.8E+03	mg/kg	2.0E-03	mg/kg/day	NA		NA	5.7E-03	mg/kg/day	7.0E-01	mg/kg/day	8.1E-03
				Manganese	2.5E+02	mg/kg	8.6E-05	mg/kg/day	NA		NA	2.4E-04	mg/kg/day	1.4E-01	mg/kg/day	1.7E-03
			Exp. Route Total								1.2E-06					4.0E-02
			Dermal Absorption	Chromium	6.9E+00	mg/kg	1.6E-07	mg/kg/day	2.0E+01	mg/kg/day	3.2E-06	4.5E-07	mg/kg/day	7.5E-05	mg/kg/day	5.9E-03
				Cobalt	8.7E+00	mg/kg	2.0E-07	mg/kg/day	NA		NA	5.6E-07	mg/kg/day	3.0E-04	mg/kg/day	1.9E-03
				Iron	5.8E+03	mg/kg	1.3E-04	mg/kg/day	NA		NA	3.8E-04	mg/kg/day	7.0E-01	mg/kg/day	5.4E-04
				Manganese	2.5E+02	mg/kg	5.7E-06	mg/kg/day	NA		NA	1.6E-05	mg/kg/day	1.4E-01	mg/kg/day	1.1E-04
			Exp. Route Total								3.2E-06					8.5E-03
		Exposure Point Total									4.4E-06					4.9E-02
	Exposure Medium Total										4.4E-06					4.9E-02
Soil* in Sludge Area											4.4E-06					4.9E-02
										Total of Receptor Risks Across All Media	2.3E-05				Total of Receptor Hazards Across All Media	1.1E+00

Notes-

bold indicates soil area with greatest risk or hazard index

NA = Not applicable.

Total is maximum of surface soil in waste area, outside waste area, or across site, or soil in sludge area.

Soil* indicates combined surface and subsurface soil.

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	NA	NA	NA	NA	NA	2.9E-06	mg/kg/day	2.0E-03	mg/kg/day	1.4E-03
				Benzo(a)anthracene	4.2E-02	mg/kg	NA	NA	NA	NA	NA	5.8E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	NA	NA	NA	NA	NA	5.5E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	NA	NA	NA	NA	NA	7.7E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	NA	NA	NA	NA	NA	6.3E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	NA	NA	NA	NA	NA	6.8E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	1.3E-07	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	NA	NA	NA	NA	NA	4.2E-07	mg/kg/day	8.0E-03	mg/kg/day	5.3E-05
				Aroclor-1254	1.2E+01	mg/kg	NA	NA	NA	NA	NA	1.6E-05	mg/kg/day	2.0E-05	mg/kg/day	7.9E-01
				Aroclor-1260	7.4E-01	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	NA	NA	NA	NA	NA	5.5E-08	mg/kg/day	5.0E-05	mg/kg/day	1.1E-03
				Heptachlor	1.4E-01	mg/kg	NA	NA	NA	NA	NA	1.9E-07	mg/kg/day	5.0E-04	mg/kg/day	3.8E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	NA	NA	NA	NA	NA	5.6E-06	mg/kg/day	5.0E-04	mg/kg/day	1.1E-02
				Aluminum	9.0E+04	mg/kg	NA	NA	NA	NA	NA	1.2E-01	mg/kg/day	1.0E+00	mg/kg/day	1.2E-01
				Arsenic	2.9E+00	mg/kg	NA	NA	NA	NA	NA	4.0E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Cadmium	5.0E+02	mg/kg	NA	NA	NA	NA	NA	6.9E-04	mg/kg/day	1.0E-03	mg/kg/day	6.9E-01
				Chromium	2.1E+01	mg/kg	NA	NA	NA	NA	NA	2.9E-05	mg/kg/day	3.0E-03	mg/kg/day	9.7E-03
				Cobalt	5.2E+00	mg/kg	NA	NA	NA	NA	NA	7.1E-06	mg/kg/day	3.0E-04	mg/kg/day	2.4E-02
				Copper	5.2E+03	mg/kg	NA	NA	NA	NA	NA	7.1E-03	mg/kg/day	4.0E-02	mg/kg/day	1.8E-01
				Iron	1.1E+04	mg/kg	NA	NA	NA	NA	NA	1.5E-02	mg/kg/day	7.0E-01	mg/kg/day	2.1E-02
				Manganese	7.5E+02	mg/kg	NA	NA	NA	NA	NA	1.0E-03	mg/kg/day	1.4E-01	mg/kg/day	7.3E-03
				Vanadium	3.4E+01	mg/kg	NA	NA	NA	NA	NA	4.6E-05	mg/kg/day	5.0E-03	mg/kg/day	9.2E-03
			Exp. Route Total								NA					1.9E+00
			Dermal Absorption													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	NA	NA	NA	NA	NA	1.1E-06	mg/kg/day	2.0E-03	mg/kg/day	5.7E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	NA	NA	NA	NA	NA	3.0E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	NA	NA	NA	NA	NA	2.8E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	NA	NA	NA	NA	NA	4.0E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	NA	NA	NA	NA	NA	3.3E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	NA	NA	NA	NA	NA	3.6E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	5.1E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	NA	NA	NA	NA	NA	1.7E-07	mg/kg/day	8.0E-03	mg/kg/day	2.1E-05
				Aroclor-1254	1.2E+01	mg/kg	NA	NA	NA	NA	NA	8.9E-06	mg/kg/day	2.0E-05	mg/kg/day	4.4E-01
				Aroclor-1260	7.4E-01	mg/kg	NA	NA	NA	NA	NA	5.7E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	NA	NA	NA	NA	NA	2.2E-08	mg/kg/day	5.0E-05	mg/kg/day	4.3E-04
				Heptachlor	1.4E-01	mg/kg	NA	NA	NA	NA	NA	7.7E-08	mg/kg/day	5.0E-04	mg/kg/day	1.5E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	NA	NA	NA	NA	NA	7.2E-07	mg/kg/day	5.0E-04	mg/kg/day	1.4E-03
				Aluminum	9.0E+04	mg/kg	NA	NA	NA	NA	NA	4.9E-03	mg/kg/day	1.0E+00	mg/kg/day	4.9E-03
				Arsenic	2.9E+00	mg/kg	NA	NA	NA	NA	NA	4.8E-07	mg/kg/day	3.0E-04	mg/kg/day	1.6E-03
				Cadmium	5.0E+02	mg/kg	NA	NA	NA	NA	NA	2.8E-06	mg/kg/day	2.5E-05	mg/kg/day	1.1E-01

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Chromium	2.1E+01	mg/kg	NA	NA	NA	NA	NA	1.2E-06	mg/kg/day	7.5E-05	mg/kg/day	1.5E-02
				Cobalt	5.2E+00	mg/kg	NA	NA	NA	NA	NA	2.8E-07	mg/kg/day	3.0E-04	mg/kg/day	9.4E-04
				Copper	5.2E+03	mg/kg	NA	NA	NA	NA	NA	2.8E-04	mg/kg/day	4.0E-02	mg/kg/day	7.0E-03
				Iron	1.1E+04	mg/kg	NA	NA	NA	NA	NA	5.9E-04	mg/kg/day	7.0E-01	mg/kg/day	8.4E-04
				Manganese	7.5E+02	mg/kg	NA	NA	NA	NA	NA	4.1E-05	mg/kg/day	1.4E-01	mg/kg/day	2.9E-04
				Vanadium	3.4E+01	mg/kg	NA	NA	NA	NA	NA	1.8E-06	mg/kg/day	5.0E-03	mg/kg/day	3.7E-04
			Exp. Route Total								NA					5.9E-01
		Exposure Point Total									NA					2.5E+00
	Exposure Medium Total										NA					2.5E+00
	Air	Emissions from Soil in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3	NA	NA	NA	NA	NA	1.5E-08	mg/m^3	1.0E-04	mg/m^3	1.5E-04
			Exp. Route Total								NA					1.5E-04
		Exposure Point Total									NA					1.5E-04
	Exposure Medium Total										NA					1.5E-04
Soil* In Waste Area											NA					**2.5E+00**
Soil*	Soil*	Soil Across Site	Ingestion													
				2,4-Dinitrotoluene	2.1E-01	mg/kg	NA	NA	NA	NA	NA	2.9E-07	mg/kg/day	2.0E-03	mg/kg/day	1.4E-04
				Benzo(a)anthracene	7.0E-02	mg/kg	NA	NA	NA	NA	NA	9.6E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	NA	NA	NA	NA	NA	1.6E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	NA	NA	NA	NA	NA	1.2E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	NA	NA	NA	NA	NA	1.2E-07	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	NA	NA	NA	NA	NA	1.2E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	6.2E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	2.1E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	1.3E-07	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	NA	NA	NA	NA	NA	5.4E-08	mg/kg/day	8.0E-03	mg/kg/day	6.7E-06
				Aroclor-1254	3.2E+00	mg/kg	NA	NA	NA	NA	NA	4.4E-06	mg/kg/day	2.0E-05	mg/kg/day	2.2E-01
				Aroclor-1260	2.2E-01	mg/kg	NA	NA	NA	NA	NA	3.0E-07	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	NA	NA	NA	NA	NA	4.8E-09	mg/kg/day	5.0E-05	mg/kg/day	9.5E-05
				Heptachlor	1.7E-02	mg/kg	NA	NA	NA	NA	NA	2.3E-08	mg/kg/day	5.0E-04	mg/kg/day	4.6E-05
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	NA	NA	NA	NA	NA	1.8E-06	mg/kg/day	5.0E-04	mg/kg/day	3.7E-03
				Aluminum	2.6E+04	mg/kg	NA	NA	NA	NA	NA	3.6E-02	mg/kg/day	1.0E+00	mg/kg/day	3.6E-02
				Antimony	6.9E-01	mg/kg	NA	NA	NA	NA	NA	9.5E-07	mg/kg/day	4.0E-04	mg/kg/day	2.4E-03
				Arsenic	1.7E+01	mg/kg	NA	NA	NA	NA	NA	2.3E-05	mg/kg/day	3.0E-04	mg/kg/day	7.6E-02
				Cadmium	8.1E+01	mg/kg	NA	NA	NA	NA	NA	1.1E-04	mg/kg/day	1.0E-03	mg/kg/day	1.1E-01
				Chromium	1.7E+01	mg/kg	NA	NA	NA	NA	NA	2.4E-05	mg/kg/day	3.0E-03	mg/kg/day	7.9E-03
				Cobalt	2.9E+00	mg/kg	NA	NA	NA	NA	NA	3.9E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Copper	9.0E+02	mg/kg	NA	NA	NA	NA	NA	1.2E-03	mg/kg/day	4.0E-02	mg/kg/day	3.1E-02
				Iron	1.2E+04	mg/kg	NA	NA	NA	NA	NA	1.6E-02	mg/kg/day	7.0E-01	mg/kg/day	2.3E-02
				Manganese	2.4E+02	mg/kg	NA	NA	NA	NA	NA	3.3E-04	mg/kg/day	1.4E-01	mg/kg/day	2.3E-03

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Ingestion	Mercury	2.1E-01	mg/kg	NA	NA	NA	NA	NA	2.8E-07	mg/kg/day	1.0E-04	mg/kg/day	2.8E-03
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	2.5E-05	mg/kg/day	5.0E-03	mg/kg/day	5.1E-03
			Exp. Route Total								NA					5.3E-01
			Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	NA	NA	NA	NA	NA	1.1E-07	mg/kg/day	2.0E-03	mg/kg/day	5.7E-05
				Benzo(a)anthracene	7.0E-02	mg/kg	NA	NA	NA	NA	NA	5.0E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	NA	NA	NA	NA	NA	8.0E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	NA	NA	NA	NA	NA	6.4E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	NA	NA	NA	NA	NA	6.1E-08	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	NA	NA	NA	NA	NA	6.1E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	3.2E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	1.1E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	5.1E-08	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	NA	NA	NA	NA	NA	2.1E-08	mg/kg/day	8.0E-03	mg/kg/day	2.7E-06
				Aroclor-1254	3.2E+00	mg/kg	NA	NA	NA	NA	NA	2.4E-06	mg/kg/day	2.0E-05	mg/kg/day	1.2E-01
				Aroclor-1260	2.2E-01	mg/kg	NA	NA	NA	NA	NA	1.7E-07	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	NA	NA	NA	NA	NA	1.9E-09	mg/kg/day	5.0E-05	mg/kg/day	3.8E-05
				Heptachlor	1.7E-02	mg/kg	NA	NA	NA	NA	NA	9.3E-09	mg/kg/day	5.0E-04	mg/kg/day	1.9E-05
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	NA	NA	NA	NA	NA	2.3E-07	mg/kg/day	5.0E-04	mg/kg/day	4.7E-04
				Aluminum	2.6E+04	mg/kg	NA	NA	NA	NA	NA	1.4E-03	mg/kg/day	1.0E+00	mg/kg/day	1.4E-03
				Antimony	6.9E-01	mg/kg	NA	NA	NA	NA	NA	3.8E-08	mg/kg/day	6.0E-05	mg/kg/day	6.3E-04
				Arsenic	1.7E+01	mg/kg	NA	NA	NA	NA	NA	2.7E-06	mg/kg/day	3.0E-04	mg/kg/day	9.0E-03
				Cadmium	8.1E+01	mg/kg	NA	NA	NA	NA	NA	4.5E-07	mg/kg/day	2.5E-05	mg/kg/day	1.8E-02
				Chromium	1.7E+01	mg/kg	NA	NA	NA	NA	NA	9.5E-07	mg/kg/day	7.5E-05	mg/kg/day	1.3E-02
				Cobalt	2.9E+00	mg/kg	NA	NA	NA	NA	NA	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.2E-04
				Copper	9.0E+02	mg/kg	NA	NA	NA	NA	NA	4.9E-05	mg/kg/day	4.0E-02	mg/kg/day	1.2E-03
				Iron	1.2E+04	mg/kg	NA	NA	NA	NA	NA	6.3E-04	mg/kg/day	7.0E-01	mg/kg/day	9.0E-04
				Manganese	2.4E+02	mg/kg	NA	NA	NA	NA	NA	1.3E-05	mg/kg/day	1.4E-01	mg/kg/day	9.3E-05
				Mercury	2.1E-01	mg/kg	NA	NA	NA	NA	NA	1.1E-08	mg/kg/day	1.0E-04	mg/kg/day	1.1E-04
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	5.0E-03	mg/kg/day	2.0E-04
			Exp. Route Total								NA					1.7E-01
		Exposure Point Total									NA					7.0E-01
	Exposure Medium Total										NA					7.0E-01
	Air	Emissions from Soil Across Site	Inhalation	Chromium	1.3E-08	mg/m^3	NA	NA	NA	NA	NA	1.2E-08	mg/m^3	1.0E-04	mg/m^3	1.2E-04
			Exp. Route Total								NA					1.2E-04
		Exposure Point Total									NA					1.2E-04
	Exposure Medium Total										NA					1.2E-04
Soil* Across Site											NA					7.0E-01

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.2E-02	mg/kg	NA	NA	NA	NA	NA	9.8E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	NA	NA	NA	NA	NA	1.3E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	NA	NA	NA	NA	NA	1.3E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	NA	NA	NA	NA	NA	1.3E-07	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	NA	NA	NA	NA	NA	1.2E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	6.2E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	2.1E-07	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	NA	NA	NA	NA	NA	9.5E-03	mg/kg/day	1.0E+00	mg/kg/day	9.5E-03
				Antimony	7.6E-01	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	4.0E-04	mg/kg/day	2.6E-03
				Arsenic	2.1E+01	mg/kg	NA	NA	NA	NA	NA	2.8E-05	mg/kg/day	3.0E-04	mg/kg/day	9.4E-02
				Chromium	1.4E+01	mg/kg	NA	NA	NA	NA	NA	1.9E-05	mg/kg/day	3.0E-03	mg/kg/day	6.2E-03
				Cobalt	2.8E+00	mg/kg	NA	NA	NA	NA	NA	3.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Iron	1.0E+04	mg/kg	NA	NA	NA	NA	NA	1.4E-02	mg/kg/day	7.0E-01	mg/kg/day	2.0E-02
				Manganese	1.3E+02	mg/kg	NA	NA	NA	NA	NA	1.8E-04	mg/kg/day	1.4E-01	mg/kg/day	1.3E-03
				Mercury	2.4E-01	mg/kg	NA	NA	NA	NA	NA	3.2E-07	mg/kg/day	1.0E-04	mg/kg/day	3.2E-03
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	2.6E-05	mg/kg/day	1.0E-04	mg/kg/day	2.6E-01
			Exp. Route Total								NA					4.1E-01
			Dermal Absorption													
				Benzo(a)anthracene	7.2E-02	mg/kg	NA	NA	NA	NA	NA	5.1E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	NA	NA	NA	NA	NA	7.0E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	NA	NA	NA	NA	NA	6.9E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	NA	NA	NA	NA	NA	6.6E-08	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	NA	NA	NA	NA	NA	6.3E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	3.2E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	1.1E-07	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	NA	NA	NA	NA	NA	3.8E-04	mg/kg/day	1.0E+00	mg/kg/day	3.8E-04
				Antimony	7.6E-01	mg/kg	NA	NA	NA	NA	NA	4.2E-08	mg/kg/day	6.0E-05	mg/kg/day	6.9E-04
				Arsenic	2.1E+01	mg/kg	NA	NA	NA	NA	NA	3.4E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Chromium	1.4E+01	mg/kg	NA	NA	NA	NA	NA	7.5E-07	mg/kg/day	7.5E-05	mg/kg/day	1.0E-02
				Cobalt	2.8E+00	mg/kg	NA	NA	NA	NA	NA	1.5E-07	mg/kg/day	3.0E-04	mg/kg/day	5.1E-04
				Iron	1.0E+04	mg/kg	NA	NA	NA	NA	NA	5.6E-04	mg/kg/day	7.0E-01	mg/kg/day	7.9E-04
				Manganese	1.3E+02	mg/kg	NA	NA	NA	NA	NA	7.3E-06	mg/kg/day	1.4E-01	mg/kg/day	5.2E-05
				Mercury	2.4E-01	mg/kg	NA	NA	NA	NA	NA	1.3E-08	mg/kg/day	1.0E-04	mg/kg/day	1.3E-04
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	5.0E-03	mg/kg/day	2.1E-04
			Exp. Route Total								NA					2.4E-02
		Exposure Point Total									NA					4.3E-01
	Exposure Medium Total										NA					4.3E-01

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Air	Emissions from Soil Outside Waste Area	Inhalation	Chromium	1.0E-08	mg/m^3	NA	NA	NA	NA	NA	9.6E-09	mg/m^3	1.0E-04	mg/m^3	9.6E-05
			Exp. Route Total								NA					9.6E-05
		Exposure Point Total									NA					9.6E-05
	Exposure Medium Total										NA					9.6E-05
Soil* Outside Waste Area											NA					4.3E-01
Soil*	Soil*	Soil in Sludge Area	Ingestion	Chromium	6.9E+00	mg/kg	NA	NA	NA	NA	NA	9.5E-06	mg/kg/day	3.0E-03	mg/kg/day	3.2E-03
				Cobalt	8.7E+00	mg/kg	NA	NA	NA	NA	NA	1.2E-05	mg/kg/day	3.0E-04	mg/kg/day	4.0E-02
				Iron	5.8E+03	mg/kg	NA	NA	NA	NA	NA	8.0E-03	mg/kg/day	7.0E-01	mg/kg/day	1.1E-02
				Manganese	2.5E+02	mg/kg	NA	NA	NA	NA	NA	3.4E-04	mg/kg/day	1.4E-01	mg/kg/day	2.4E-03
			Exp. Route Total								NA					5.7E-02
			Dermal Absorption	Chromium	6.9E+00	mg/kg	NA	NA	NA	NA	NA	3.8E-07	mg/kg/day	7.5E-05	mg/kg/day	5.0E-03
				Cobalt	8.7E+00	mg/kg	NA	NA	NA	NA	NA	4.8E-07	mg/kg/day	3.0E-04	mg/kg/day	1.6E-03
				Iron	5.8E+03	mg/kg	NA	NA	NA	NA	NA	3.2E-04	mg/kg/day	7.0E-01	mg/kg/day	4.5E-04
				Manganese	2.5E+02	mg/kg	NA	NA	NA	NA	NA	1.3E-05	mg/kg/day	1.4E-01	mg/kg/day	9.6E-05
			Exp. Route Total								NA					7.2E-03
		Exposure Point Total									NA					6.4E-02
	Exposure Medium Total										NA					6.4E-02
Soil* in Sludge Area											NA					6.4E-02
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Ingestion	Heptachlor epoxide	2.7E-02	ug/L	NA	NA	NA	NA	NA	7.5E-07	mg/kg/day	1.3E-05	mg/kg/day	5.7E-02
				RDX	1.8E+00	ug/L	NA	NA	NA	NA	NA	4.9E-05	mg/kg/day	3.0E-03	mg/kg/day	1.6E-02
			Exp. Route Total								N/A					7.4E-02
			Dermal Absorption	Heptachlor epoxide	2.7E-02	ug/L	NA	NA	NA	NA	NA	1.2E-06	mg/kg/day	1.3E-05	mg/kg/day	9.0E-02
				RDX	1.8E+00	ug/L	NA	NA	NA	NA	NA	4.2E-07	mg/kg/day	3.0E-03	mg/kg/day	1.4E-04
			Exp. Route Total								NA					9.1E-02
		Exposure Point Total									NA					1.6E-01
	Exposure Medium Total										NA					1.6E-01
Shallow Aquifer Groundwater Total											NA					1.6E-01

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Yorktown-Eastover Deep Aquifer Tap Water	Ingestion	Heptachlor epoxide	9.8E-03	ug/L	NA	NA	NA	NA	NA	2.7E-07	mg/kg/day	1.3E-05	mg/kg/day	2.1E-02
				Manganese	1.1E+02	ug/L	NA	NA	NA	NA	NA	3.1E-03	mg/kg/day	2.4E-02	mg/kg/day	1.3E-01
			Exp. Route Total								N/A					1.5E-01
			Dermal Absorption	Heptachlor epoxide	9.8E-03	ug/L	NA	NA	NA	NA	NA	4.2E-07	mg/kg/day	1.3E-05	mg/kg/day	3.3E-02
				Manganese	1.1E+02	ug/L	NA	NA	NA	NA	NA	1.6E-05	mg/kg/day	9.6E-04	mg/kg/day	1.7E-02
			Exp. Route Total								NA					4.9E-02
		Exposure Point Total									NA					2.0E-01
	Exposure Medium Total										NA					2.0E-01
Deep Aquifer Groundwater Total											NA					**2.0E-01**
Total of Receptor Risks Across All Media											NA	Total of Receptor Hazards Across All Media				2.7E+00

Notes-

bold indicates soil area and groundwater aquifer with greatest hazard index

NA = Not applicable.

Total is maximum of soil (in waste area, outside waste area, across site, or sludge area) and groundwater (shallow or deep).

DA_{event} for dermal exposure to groundwater calculated on Tables 7.4.RME Supplements A, B, and C

Soil* indicates combined surface and subsurface soil.

Table 7.4.RME Supplement A
Calculation of DAevent
Resident Adult Shallow Ground Water
Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Heptachlor epoxide	2.7E-02	2.1E-02	1.6E-01	1.6E+01	3.8E+01	1.0E+00	0.58	4.8E-09	2
RDX	1.8E+00	3.4E-04	1.9E-03	1.8E+00	4.4E+00	1.0E+00	0.58	1.7E-09	2

Organics: DAevent (mg/cm2-event) =

If t_{event} < t* then

$$DA_{event} = 2 \times FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \sqrt{\frac{6 \times \tau_{event} \times t_{event}}{\pi}} \qquad \text{(eq 2)}$$

If t_{event} > t* then

$$DA_{event} = FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \left[\frac{t_{event}}{1+B} + 2 \times \tau_{event} \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right] \qquad \text{(eq 3)}$$

Notes:
NA - Not applicable
Permeability constants and other input parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
Lag time and B calculated on Table 7.4.RME Supplement B. Permeability constants from RAIS databases (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

Generated by: Debbie Stannard/WDC
Checked by: Martha White/ATL

Table 7.4.RME Supplement B
Calculation of DAevent
Site 24
NWS Yorktown, Yorktown, Virginia

Chemical	**MW**	**Kp (cm/hr)**	**B[1]**	**Dsc/lsc[1]**	**lsc (cm)**	**Dsc (cm^2/hr)**	**τ[1] (hr)**	**c[1]**	**b[1]**	**t*[1] (hr)**
Heptachlor epoxide	389	2.1E-02	1.6E-01	1.1E-05	1.0E-03	1.1E-08	1.6E+01	4.5E-01	4.1E-01	3.8E+01
RDX	222	3.4E-04	1.9E-03	9.1E-05	1.0E-03	9.1E-08	1.8E+00	3.3E-01	3.0E-01	4.4E+00

1. Equations from *Dermal Exposure Assessment: Principles and Applications* . EPA/600/8-91/011B. January 1992.
   Parameter values from RAIS database (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

Table 7.4.RME Supplement C
Calculation of DAevent
Resident Adult Deep Ground Water
Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Heptachlor epoxide[1]	9.8E-03	2.1E-02	1.6E-01	1.6E+01	3.8E+01	1.0E+00	0.58	1.7E-09	2
Manganese	1.1E+02	1.0E-03	N/A	N/A	N/A	N/A	0.58	6.6E-08	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If t_{event} < t* then

$$DA_{event} = 2 \times FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \sqrt{\frac{6 \times \tau_{event} \times t_{event}}{\pi}} \qquad \text{(eq 2)}$$

If t_{event} > t* then

$$DA_{event} = FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \left[\frac{t_{event}}{1+B} + 2 \times \tau_{event} \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right] \qquad \text{(eq 3)}$$

Notes:
NA - Not applicable
Permeability constants and other input parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.4.RME Supplement B. Permeability constants from RAIS databases (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	NA	NA	NA	NA	NA	2.7E-05	mg/kg/day	2.0E-03	mg/kg/day	1.3E-02
				Benzo(a)anthracene	4.2E-02	mg/kg	NA	NA	NA	NA	NA	5.4E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	NA	NA	NA	NA	NA	5.1E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	NA	NA	NA	NA	NA	7.2E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	NA	NA	NA	NA	NA	5.9E-07	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	NA	NA	NA	NA	NA	6.4E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	1.2E-06	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	NA	NA	NA	NA	NA	3.9E-06	mg/kg/day	8.0E-03	mg/kg/day	4.9E-04
				Aroclor-1254	1.2E+01	mg/kg	NA	NA	NA	NA	NA	1.5E-04	mg/kg/day	2.0E-05	mg/kg/day	7.4E+00
				Aroclor-1260	7.4E-01	mg/kg	NA	NA	NA	NA	NA	9.4E-06	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	NA	NA	NA	NA	NA	5.1E-07	mg/kg/day	5.0E-05	mg/kg/day	1.0E-02
				Heptachlor	1.4E-01	mg/kg	NA	NA	NA	NA	NA	1.8E-06	mg/kg/day	5.0E-04	mg/kg/day	3.6E-03
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	NA	NA	NA	NA	NA	5.2E-05	mg/kg/day	5.0E-04	mg/kg/day	1.0E-01
				Aluminum	9.0E+04	mg/kg	NA	NA	NA	NA	NA	1.1E+00	mg/kg/day	1.0E+00	mg/kg/day	1.1E+00
				Arsenic	2.9E+00	mg/kg	NA	NA	NA	NA	NA	3.7E-05	mg/kg/day	3.0E-04	mg/kg/day	1.2E-01
				Cadmium	5.0E+02	mg/kg	NA	NA	NA	NA	NA	6.4E-03	mg/kg/day	1.0E-03	mg/kg/day	6.4E+00
				Chromium	2.1E+01	mg/kg	NA	NA	NA	NA	NA	2.7E-04	mg/kg/day	3.0E-03	mg/kg/day	9.0E-02
				Cobalt	5.2E+00	mg/kg	NA	NA	NA	NA	NA	6.6E-05	mg/kg/day	3.0E-04	mg/kg/day	2.2E-01
				Copper	5.2E+03	mg/kg	NA	NA	NA	NA	NA	6.6E-02	mg/kg/day	4.0E-02	mg/kg/day	1.6E+00
				Iron	1.1E+04	mg/kg	NA	NA	NA	NA	NA	1.4E-01	mg/kg/day	7.0E-01	mg/kg/day	2.0E-01
				Manganese	7.5E+02	mg/kg	NA	NA	NA	NA	NA	9.5E-03	mg/kg/day	1.4E-01	mg/kg/day	6.8E-02
				Vanadium	3.4E+01	mg/kg	NA	NA	NA	NA	NA	4.3E-04	mg/kg/day	5.0E-03	mg/kg/day	8.6E-02
			Exp. Route Total								NA					1.8E+01
			Dermal Absorption													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	NA	NA	NA	NA	NA	7.5E-06	mg/kg/day	2.0E-03	mg/kg/day	3.8E-03
				Benzo(a)anthracene	4.2E-02	mg/kg	NA	NA	NA	NA	NA	2.0E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	NA	NA	NA	NA	NA	1.9E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	NA	NA	NA	NA	NA	2.6E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	NA	NA	NA	NA	NA	2.1E-07	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	NA	NA	NA	NA	NA	2.3E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	3.3E-07	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	NA	NA	NA	NA	NA	1.1E-06	mg/kg/day	8.0E-03	mg/kg/day	1.4E-04
				Aroclor-1254	1.2E+01	mg/kg	NA	NA	NA	NA	NA	5.8E-05	mg/kg/day	2.0E-05	mg/kg/day	2.9E+00
				Aroclor-1260	7.4E-01	mg/kg	NA	NA	NA	NA	NA	3.7E-06	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	NA	NA	NA	NA	NA	1.4E-07	mg/kg/day	5.0E-05	mg/kg/day	2.8E-03
				Heptachlor	1.4E-01	mg/kg	NA	NA	NA	NA	NA	5.0E-07	mg/kg/day	5.0E-04	mg/kg/day	1.0E-03
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	NA	NA	NA	NA	NA	4.7E-06	mg/kg/day	5.0E-04	mg/kg/day	9.4E-03
				Aluminum	9.0E+04	mg/kg	NA	NA	NA	NA	NA	3.2E-02	mg/kg/day	1.0E+00	mg/kg/day	3.2E-02
				Arsenic	2.9E+00	mg/kg	NA	NA	NA	NA	NA	3.1E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Cadmium	5.0E+02	mg/kg	NA	NA	NA	NA	NA	1.8E-05	mg/kg/day	2.5E-05	mg/kg/day	7.2E-01

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Chromium	2.1E+01	mg/kg	NA	NA	NA	NA	NA	7.6E-06	mg/kg/day	7.5E-05	mg/kg/day	1.0E-01
				Cobalt	5.2E+00	mg/kg	NA	NA	NA	NA	NA	1.8E-06	mg/kg/day	3.0E-04	mg/kg/day	6.2E-03
				Copper	5.2E+03	mg/kg	NA	NA	NA	NA	NA	1.8E-03	mg/kg/day	4.0E-02	mg/kg/day	4.6E-02
				Iron	1.1E+04	mg/kg	NA	NA	NA	NA	NA	3.8E-03	mg/kg/day	7.0E-01	mg/kg/day	5.5E-03
				Manganese	7.5E+02	mg/kg	NA	NA	NA	NA	NA	2.7E-04	mg/kg/day	1.4E-01	mg/kg/day	1.9E-03
				Vanadium	3.4E+01	mg/kg	NA	NA	NA	NA	NA	1.2E-05	mg/kg/day	5.0E-03	mg/kg/day	2.4E-03
			Exp. Route Total								NA					3.9E+00
		Exposure Point Total									NA					2.1E+01
	Exposure Medium Total										NA					2.1E+01
	Air	Emissions from Soil* in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3	NA	NA	NA	NA	NA	1.5E-08	mg/m^3	1.0E-04	mg/m^3	1.5E-04
			Exp. Route Total								NA					1.5E-04
		Exposure Point Total									NA					1.5E-04
	Exposure Medium Total										NA					1.5E-04
Soil* In Waste Area											NA					**2.1E+01**
Soil*	Soil*	Soil Across Site	Ingestion	2,4-Dinitrotoluene	2.1E-01	mg/kg	NA	NA	NA	NA	NA	2.7E-06	mg/kg/day	2.0E-03	mg/kg/day	1.3E-03
				Benzo(a)anthracene	7.0E-02	mg/kg	NA	NA	NA	NA	NA	8.9E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	NA	NA	NA	NA	NA	1.4E-06	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	NA	NA	NA	NA	NA	1.1E-06	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	NA	NA	NA	NA	NA	1.1E-06	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	NA	NA	NA	NA	NA	1.1E-06	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	5.8E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	1.9E-06	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	1.2E-06	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	NA	NA	NA	NA	NA	5.0E-07	mg/kg/day	8.0E-03	mg/kg/day	6.3E-05
				Aroclor-1254	3.2E+00	mg/kg	NA	NA	NA	NA	NA	4.1E-05	mg/kg/day	2.0E-05	mg/kg/day	2.0E+00
				Aroclor-1260	2.2E-01	mg/kg	NA	NA	NA	NA	NA	2.8E-06	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	NA	NA	NA	NA	NA	4.4E-08	mg/kg/day	5.0E-05	mg/kg/day	8.9E-04
				Heptachlor	1.7E-02	mg/kg	NA	NA	NA	NA	NA	2.2E-07	mg/kg/day	5.0E-04	mg/kg/day	4.3E-04
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	NA	NA	NA	NA	NA	1.7E-05	mg/kg/day	5.0E-04	mg/kg/day	3.4E-02
				Aluminum	2.6E+04	mg/kg	NA	NA	NA	NA	NA	3.3E-01	mg/kg/day	1.0E+00	mg/kg/day	3.3E-01
				Antimony	6.9E-01	mg/kg	NA	NA	NA	NA	NA	8.9E-06	mg/kg/day	4.0E-04	mg/kg/day	2.2E-02
				Arsenic	1.7E+01	mg/kg	NA	NA	NA	NA	NA	2.1E-04	mg/kg/day	3.0E-04	mg/kg/day	7.0E-01
				Cadmium	8.1E+01	mg/kg	NA	NA	NA	NA	NA	1.0E-03	mg/kg/day	1.0E-03	mg/kg/day	1.0E+00
				Chromium	1.7E+01	mg/kg	NA	NA	NA	NA	NA	2.2E-04	mg/kg/day	3.0E-03	mg/kg/day	7.4E-02
				Cobalt	2.9E+00	mg/kg	NA	NA	NA	NA	NA	3.7E-05	mg/kg/day	3.0E-04	mg/kg/day	1.2E-01
				Copper	9.0E+02	mg/kg	NA	NA	NA	NA	NA	1.2E-02	mg/kg/day	4.0E-02	mg/kg/day	2.9E-01
				Iron	1.2E+04	mg/kg	NA	NA	NA	NA	NA	1.5E-01	mg/kg/day	7.0E-01	mg/kg/day	2.1E-01
				Manganese	2.4E+02	mg/kg	NA	NA	NA	NA	NA	3.1E-03	mg/kg/day	1.4E-01	mg/kg/day	2.2E-02

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Ingestion	Mercury	2.1E-01	mg/kg	NA	NA	NA	NA	NA	2.6E-06	mg/kg/day	1.0E-04	mg/kg/day	2.6E-02
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	2.4E-04	mg/kg/day	5.0E-03	mg/kg/day	4.7E-02
			Exp. Route Total								NA					5.0E+00
			Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	NA	NA	NA	NA	NA	7.4E-07	mg/kg/day	2.0E-03	mg/kg/day	3.7E-04
				Benzo(a)anthracene	7.0E-02	mg/kg	NA	NA	NA	NA	NA	3.3E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	NA	NA	NA	NA	NA	5.3E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	NA	NA	NA	NA	NA	4.2E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	NA	NA	NA	NA	NA	4.0E-07	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	NA	NA	NA	NA	NA	4.0E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	2.1E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	7.0E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	3.3E-07	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	NA	NA	NA	NA	NA	1.4E-07	mg/kg/day	8.0E-03	mg/kg/day	1.8E-05
				Aroclor-1254	3.2E+00	mg/kg	NA	NA	NA	NA	NA	1.6E-05	mg/kg/day	2.0E-05	mg/kg/day	8.0E-01
				Aroclor-1260	2.2E-01	mg/kg	NA	NA	NA	NA	NA	1.1E-06	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	NA	NA	NA	NA	NA	1.2E-08	mg/kg/day	5.0E-05	mg/kg/day	2.5E-04
				Heptachlor	1.7E-02	mg/kg	NA	NA	NA	NA	NA	6.1E-08	mg/kg/day	5.0E-04	mg/kg/day	1.2E-04
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	NA	NA	NA	NA	NA	1.5E-06	mg/kg/day	5.0E-04	mg/kg/day	3.1E-03
				Aluminum	2.6E+04	mg/kg	NA	NA	NA	NA	NA	9.3E-03	mg/kg/day	1.0E+00	mg/kg/day	9.3E-03
				Antimony	6.9E-01	mg/kg	NA	NA	NA	NA	NA	2.5E-07	mg/kg/day	6.0E-05	mg/kg/day	4.1E-03
				Arsenic	1.7E+01	mg/kg	NA	NA	NA	NA	NA	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	5.9E-02
				Cadmium	8.1E+01	mg/kg	NA	NA	NA	NA	NA	2.9E-06	mg/kg/day	2.5E-05	mg/kg/day	1.2E-01
				Chromium	1.7E+01	mg/kg	NA	NA	NA	NA	NA	6.2E-06	mg/kg/day	7.5E-05	mg/kg/day	8.3E-02
				Cobalt	2.9E+00	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	3.0E-04	mg/kg/day	3.4E-03
				Copper	9.0E+02	mg/kg	NA	NA	NA	NA	NA	3.2E-04	mg/kg/day	4.0E-02	mg/kg/day	8.1E-03
				Iron	1.2E+04	mg/kg	NA	NA	NA	NA	NA	4.1E-03	mg/kg/day	7.0E-01	mg/kg/day	5.9E-03
				Manganese	2.4E+02	mg/kg	NA	NA	NA	NA	NA	8.6E-05	mg/kg/day	1.4E-01	mg/kg/day	6.1E-04
				Mercury	2.1E-01	mg/kg	NA	NA	NA	NA	NA	7.4E-08	mg/kg/day	1.0E-04	mg/kg/day	7.4E-04
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	6.6E-06	mg/kg/day	5.0E-03	mg/kg/day	1.3E-03
			Exp. Route Total								NA					1.1E+00
		Exposure Point Total									NA					6.1E+00
	Exposure Medium Total										NA					6.1E+00
	Air	Emissions from Soil Across Site	Inhalation	Chromium	1.3E-08	mg/m^3	NA	NA	NA	NA	NA	1.2E-08	mg/m^3	1.0E-04	mg/m^3	1.2E-04
			Exp. Route Total								NA					1.2E-04
		Exposure Point Total									NA					1.2E-04
	Exposure Medium Total										NA					1.2E-04
Soil* Across Site											NA					6.1E+00

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.2E-02	mg/kg	NA	NA	NA	NA	NA	9.2E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	NA	NA	NA	NA	NA	1.3E-06	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	NA	NA	NA	NA	NA	1.2E-06	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	NA	NA	NA	NA	NA	1.2E-06	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	NA	NA	NA	NA	NA	1.1E-06	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	5.8E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	1.9E-06	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	NA	NA	NA	NA	NA	8.9E-02	mg/kg/day	1.0E+00	mg/kg/day	8.9E-02
				Antimony	7.6E-01	mg/kg	NA	NA	NA	NA	NA	9.7E-06	mg/kg/day	4.0E-04	mg/kg/day	2.4E-02
				Arsenic	2.1E+01	mg/kg	NA	NA	NA	NA	NA	2.6E-04	mg/kg/day	3.0E-04	mg/kg/day	8.8E-01
				Chromium	1.4E+01	mg/kg	NA	NA	NA	NA	NA	1.7E-04	mg/kg/day	3.0E-03	mg/kg/day	5.8E-02
				Cobalt	2.8E+00	mg/kg	NA	NA	NA	NA	NA	3.6E-05	mg/kg/day	3.0E-04	mg/kg/day	1.2E-01
				Iron	1.0E+04	mg/kg	NA	NA	NA	NA	NA	1.3E-01	mg/kg/day	7.0E-01	mg/kg/day	1.9E-01
				Manganese	1.3E+02	mg/kg	NA	NA	NA	NA	NA	1.7E-03	mg/kg/day	1.4E-01	mg/kg/day	1.2E-02
				Mercury	2.4E-01	mg/kg	NA	NA	NA	NA	NA	3.0E-06	mg/kg/day	1.0E-04	mg/kg/day	3.0E-02
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	2.4E-04	mg/kg/day	5.0E-03	mg/kg/day	4.8E-02
			Exp. Route Total								NA					1.4E+00
			Dermal Absorption													
				Benzo(a)anthracene	7.2E-02	mg/kg	NA	NA	NA	NA	NA	3.3E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	NA	NA	NA	NA	NA	4.6E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	NA	NA	NA	NA	NA	4.5E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	NA	NA	NA	NA	NA	4.3E-07	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	NA	NA	NA	NA	NA	4.1E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	2.1E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	7.0E-07	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	NA	NA	NA	NA	NA	2.5E-03	mg/kg/day	1.0E+00	mg/kg/day	2.5E-03
				Antimony	7.6E-01	mg/kg	NA	NA	NA	NA	NA	2.7E-07	mg/kg/day	6.0E-05	mg/kg/day	4.5E-03
				Arsenic	2.1E+01	mg/kg	NA	NA	NA	NA	NA	2.2E-05	mg/kg/day	3.0E-04	mg/kg/day	7.4E-02
				Chromium	1.4E+01	mg/kg	NA	NA	NA	NA	NA	4.9E-06	mg/kg/day	7.5E-05	mg/kg/day	6.5E-02
				Cobalt	2.8E+00	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	3.0E-04	mg/kg/day	3.3E-03
				Iron	1.0E+04	mg/kg	NA	NA	NA	NA	NA	3.6E-03	mg/kg/day	7.0E-01	mg/kg/day	5.2E-03
				Manganese	1.3E+02	mg/kg	NA	NA	NA	NA	NA	4.8E-05	mg/kg/day	1.4E-01	mg/kg/day	3.4E-04
				Mercury	2.4E-01	mg/kg	NA	NA	NA	NA	NA	8.4E-08	mg/kg/day	1.0E-04	mg/kg/day	8.4E-04
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	6.7E-06	mg/kg/day	5.0E-03	mg/kg/day	1.3E-03
			Exp. Route Total								NA					1.6E-01
		Exposure Point Total									NA					1.6E+00
	Exposure Medium Total										NA					1.6E+00
	Air	Emissions from Soil Outside Waste Area	Inhalation													
				Chromium	1.0E-08	mg/m^3	NA	NA	NA	NA	NA	9.6E-09	mg/m^3	1.0E-04	mg/m^3	9.6E-05
			Exp. Route Total								NA					9.6E-05
		Exposure Point Total									NA					9.6E-05
	Exposure Medium Total										NA					9.6E-05
Soil* Outside Waste Area											NA					1.6E+00

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil In Sludge Area	Ingestion	Chromium	6.9E+00	mg/kg	NA	NA	NA	NA	NA	8.8E-05	mg/kg/day	3.0E-03	mg/kg/day	2.9E-02
				Cobalt	8.7E+00	mg/kg	NA	NA	NA	NA	NA	1.1E-04	mg/kg/day	3.0E-04	mg/kg/day	3.7E-01
				Iron	5.8E+03	mg/kg	NA	NA	NA	NA	NA	7.4E-02	mg/kg/day	7.0E-01	mg/kg/day	1.1E-01
				Manganese	2.5E+02	mg/kg	NA	NA	NA	NA	NA	3.1E-03	mg/kg/day	1.4E-01	mg/kg/day	2.2E-02
			Exp. Route Total								NA					5.3E-01
			Dermal Absorption	Chromium	6.9E+00	mg/kg	NA	NA	NA	NA	NA	2.5E-06	mg/kg/day	7.5E-05	mg/kg/day	3.3E-02
				Cobalt	8.7E+00	mg/kg	NA	NA	NA	NA	NA	3.1E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Iron	5.8E+03	mg/kg	NA	NA	NA	NA	NA	2.1E-03	mg/kg/day	7.0E-01	mg/kg/day	3.0E-03
				Manganese	2.5E+02	mg/kg	NA	NA	NA	NA	NA	8.8E-05	mg/kg/day	1.4E-01	mg/kg/day	6.3E-04
			Exp. Route Total								NA					4.7E-02
		Exposure Point Total									NA					5.8E-01
	Exposure Medium Total										NA					5.8E-01
Soil* in Sludge Area											NA					5.8E-01
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Ingestion	Heptachlor epoxide	2.7E-02	ug/L	NA	NA	NA	NA	NA	1.7E-06	mg/kg/day	1.3E-05	mg/kg/day	1.3E-01
				RDX	1.8E+00	ug/L	NA	NA	NA	NA	NA	1.1E-04	mg/kg/day	3.0E-03	mg/kg/day	3.8E-02
			Exp. Route Total								N/A					1.7E-01
			Dermal Absorption	Heptachlor epoxide	2.7E-02	ug/L	NA	NA	NA	NA	NA	2.6E-06	mg/kg/day	1.3E-05	mg/kg/day	2.0E-01
				RDX	1.8E+00	ug/L	NA	NA	NA	NA	NA	9.5E-07	mg/kg/day	3.0E-03	mg/kg/day	3.2E-04
			Exp. Route Total								NA					2.0E-01
		Exposure Point Total									NA					3.8E-01
	Exposure Medium Total										NA					3.8E-01
Shallow Aquifer Groundwater Total											NA					3.8E-01
Groundwater	Groundwater	Yorktown-Eastover Deep Aquifer Tap Water	Ingestion	Heptachlor epoxide	9.8E-03	ug/L	NA	NA	NA	NA	NA	6.3E-07	mg/kg/day	1.3E-05	mg/kg/day	4.8E-02
				Manganese	1.1E+02	ug/L	NA	NA	NA	NA	NA	7.2E-03	mg/kg/day	2.4E-02	mg/kg/day	3.0E-01
			Exp. Route Total								N/A					3.5E-01
			Dermal Absorption	Heptachlor epoxide	9.8E-03	ug/L	NA	NA	NA	NA	NA	9.5E-07	mg/kg/day	1.3E-05	mg/kg/day	7.3E-02
				Manganese	1.1E+02	ug/L	NA	NA	NA	NA	NA	4.8E-05	mg/kg/day	9.6E-04	mg/kg/day	5.0E-02
			Exp. Route Total								NA					1.2E-01
		Exposure Point Total									NA					4.7E-01
	Exposure Medium Total										NA					4.7E-01
Deep Aquifer Groundwater Total											NA					**4.7E-01**
										Total of Receptor Risks Across All Media	NA			Total of Receptor Hazards Across All Media		2.2E+01

Notes-

bold indicates soil area and groundwater aquifer with greatest hazard index

NA = Not applicable.

Total is maximum of soil (in waste area, outside waste area, across site, or sludge area) and groundwater (shallow or deep).

DA_{event} for dermal exposure to groundwater calculated on Tables 7.4.RME Supplements A, B, and C

Table 7.5.RME Supplement A
Calculation of DAevent
Resident Child Shallow Ground Water
Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Heptachlor epoxide[1]	2.7E-02	2.1E-02	1.6E-01	1.6E+01	3.8E+01	1.0E+00	1	6.3E-09	2
RDX[1]	1.8E+00	3.4E-04	1.9E-03	1.8E+00	4.4E+00	1.0E+00	1	2.2E-09	2

Organics: DAevent (mg/cm2-event) =

If t_{event} < t* then

$$DA_{event} = 2 \times FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \sqrt{\frac{6 \times \tau_{event} \times t_{event}}{\pi}} \qquad \text{(eq 2)}$$

If t_{event} > t* then

$$DA_{event} = FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \left[\frac{t_{event}}{1+B} + 2 \times \tau_{event} \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right] \qquad \text{(eq 3)}$$

Notes:

NA - Not applicable

Permeability constants and other input parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.

B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).

t* - Time to reach steady-state

Lag time and B calculated on Table 7.4.RME Supplement B. Permeability constants from RAIS databases (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

Table 7.5.RME Supplement B
Calculation of DAevent
Resident Child Deep Ground Water
Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Heptachlor epoxide[1]	9.8E-03	2.1E-02	1.6E-01	1.6E+01	3.8E+01	1.0E+00	1	2.3E-09	2
Manganese	1.1E+02	1.0E-03	N/A	N/A	N/A	N/A	1	1.1E-07	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If t_{event} < t* then

$$DA_{event} = 2 \times FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \sqrt{\frac{6 \times \tau_{event} \times t_{event}}{\pi}} \qquad \text{(eq 2)}$$

If t_{event} > t* then

$$DA_{event} = FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \left[\frac{t_{event}}{1+B} + 2 \times \tau_{event} \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right] \qquad \text{(eq 3)}$$

Notes:
NA - Not applicable
Permeability constants and other input parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.4.RME Supplement B. Permeability constants from RAIS databases (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	3.3E-06	mg/kg/day	3.1E-01	mg/kg/day	1.0E-06	NA	NA	NA	NA	NA
				Benzo(a)anthracene[1]	4.2E-02	mg/kg			7.3E-01	mg/kg/day	2.1E-07	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	4.0E-02	mg/kg			7.3E+00	mg/kg/day	2.0E-06	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	5.6E-02	mg/kg			7.3E-01	mg/kg/day	2.7E-07	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	4.6E-02	mg/kg			7.3E-02	mg/kg/day	2.3E-08	NA	NA	NA	NA	NA
				Chrysene[1]	5.0E-02	mg/kg			7.3E-03	mg/kg/day	2.4E-09	NA	NA	NA	NA	NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	1.5E-07	mg/kg/day	7.0E+00	mg/kg/day	1.0E-06	NA	NA	NA	NA	NA
				alpha-BHC	3.1E-01	mg/kg	4.8E-07	mg/kg/day	6.3E+00	mg/kg/day	3.0E-06	NA	NA	NA	NA	NA
				Aroclor-1254	1.2E+01	mg/kg	1.8E-05	mg/kg/day	2.0E+00	mg/kg/day	3.6E-05	NA	NA	NA	NA	NA
				Aroclor-1260	7.4E-01	mg/kg	1.2E-06	mg/kg/day	2.0E+00	mg/kg/day	2.3E-06	NA	NA	NA	NA	NA
				Dieldrin	4.0E-02	mg/kg	6.2E-08	mg/kg/day	1.6E+01	mg/kg/day	1.0E-06	NA	NA	NA	NA	NA
				Heptachlor	1.4E-01	mg/kg	2.2E-07	mg/kg/day	4.5E+00	mg/kg/day	9.9E-07	NA	NA	NA	NA	NA
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	6.4E-06	mg/kg/day	3.0E-02	mg/kg/day	1.9E-07	NA	NA	NA	NA	NA
				Aluminum	9.0E+04	mg/kg	1.4E-01	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Arsenic	2.9E+00	mg/kg	4.5E-06	mg/kg/day	1.5E+00	mg/kg/day	6.8E-06	NA	NA	NA	NA	NA
				Cadmium	5.0E+02	mg/kg	7.9E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Chromium[1]	2.1E+01	mg/kg			5.0E-01	mg/kg/day	7.1E-05	NA	NA	NA	NA	NA
				Cobalt	5.2E+00	mg/kg	8.1E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Copper	5.2E+03	mg/kg	8.1E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Iron	1.1E+04	mg/kg	1.7E-02	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Manganese	7.5E+02	mg/kg	1.2E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Vanadium	3.4E+01	mg/kg	5.3E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								1.3E-04					NA
			Dermal Absorption													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	1.0E-06	mg/kg/day	3.1E-01	mg/kg/day	3.2E-07	NA	NA	NA	NA	NA
				Benzo(a)anthracene[1]	4.2E-02	mg/kg			7.3E-01	mg/kg/day	1.0E-07	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	4.0E-02	mg/kg			7.3E+00	mg/kg/day	9.9E-07	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	5.6E-02	mg/kg			7.3E-01	mg/kg/day	1.4E-07	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	4.6E-02	mg/kg			7.3E-02	mg/kg/day	1.1E-08	NA	NA	NA	NA	NA
				Chrysene[1]	5.0E-02	mg/kg			7.3E-03	mg/kg/day	1.2E-09	NA	NA	NA	NA	NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	4.6E-08	mg/kg/day	7.0E+00	mg/kg/day	3.2E-07	NA	NA	NA	NA	NA
				alpha-BHC	3.1E-01	mg/kg	1.5E-07	mg/kg/day	6.3E+00	mg/kg/day	9.6E-07	NA	NA	NA	NA	NA
				Aroclor-1254	1.2E+01	mg/kg	8.0E-06	mg/kg/day	2.0E+00	mg/kg/day	1.6E-05	NA	NA	NA	NA	NA
				Aroclor-1260	7.4E-01	mg/kg	5.1E-07	mg/kg/day	2.0E+00	mg/kg/day	1.0E-06	NA	NA	NA	NA	NA
				Dieldrin	4.0E-02	mg/kg	2.0E-08	mg/kg/day	1.6E+01	mg/kg/day	3.1E-07	NA	NA	NA	NA	NA
				Heptachlor	1.4E-01	mg/kg	6.9E-08	mg/kg/day	4.5E+00	mg/kg/day	3.1E-07	NA	NA	NA	NA	NA
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	6.5E-07	mg/kg/day	3.0E-02	mg/kg/day	1.9E-08	NA	NA	NA	NA	NA
				Aluminum	9.0E+04	mg/kg	4.4E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Arsenic	2.9E+00	mg/kg	4.3E-07	mg/kg/day	1.5E+00	mg/kg/day	6.5E-07	NA	NA	NA	NA	NA
				Cadmium	5.0E+02	mg/kg	2.5E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Chromium[1]	2.1E+01	mg/kg			2.0E+01	mg/kg/day	1.1E-04	NA	NA	NA	NA	NA
				Cobalt	5.2E+00	mg/kg	2.6E-07	mg/kg/day	NA		NA	NA	NA	NA	NA	NA

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal	Copper	5.2E+03	mg/kg	2.6E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Iron	1.1E+04	mg/kg	5.3E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Manganese	7.5E+02	mg/kg	3.7E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Vanadium	3.4E+01	mg/kg	1.7E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								1.3E-04					NA
		Exposure Point Total									2.6E-04					NA
	Exposure Medium Total										2.6E-04					NA
	Air	Emissions from Soil* in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3			8.4E-02	(ug/m3)$^{-1}$	1.4E-06	NA	NA	NA	NA	NA
			Exp. Route Total								1.4E-06					NA
		Exposure Point Total									1.4E-06					NA
	Exposure Medium Total										1.4E-06					NA
Soil* In Waste Area											**2.6E-04**					NA
Soil*	Soil*	Soil Across Site	Ingestion	2,4-Dinitrotoluene	2.1E-01	mg/kg	3.3E-07	mg/kg/day	3.1E-01	mg/kg/day	1.0E-07	NA	NA	NA	NA	NA
				Benzo(a)anthracene[1]	7.0E-02	mg/kg			7.3E-01	mg/kg/day	3.4E-07	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	1.1E-01	mg/kg			7.3E+00	mg/kg/day	5.5E-06	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	9.0E-02	mg/kg			7.3E-01	mg/kg/day	4.4E-07	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	8.5E-02	mg/kg			7.3E-02	mg/kg/day	4.2E-08	NA	NA	NA	NA	NA
				Chrysene[1]	8.6E-02	mg/kg			7.3E-03	mg/kg/day	4.2E-09	NA	NA	NA	NA	NA
				Dibenz(a,h)anthracene[1]	4.5E-02	mg/kg			7.3E+00	mg/kg/day	2.2E-06	NA	NA	NA	NA	NA
				Indeno(1,2,3-cd)pyrene[1]	1.5E-01	mg/kg			7.3E-01	mg/kg/day	7.3E-07	NA	NA	NA	NA	NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	1.5E-07	mg/kg/day	7.0E+00	mg/kg/day	1.0E-06	NA	NA	NA	NA	NA
				alpha-BHC	3.9E-02	mg/kg	6.1E-08	mg/kg/day	6.3E+00	mg/kg/day	3.9E-07	NA	NA	NA	NA	NA
				Aroclor-1254	3.2E+00	mg/kg	5.0E-06	mg/kg/day	2.0E+00	mg/kg/day	1.0E-05	NA	NA	NA	NA	NA
				Aroclor-1260	2.2E-01	mg/kg	3.4E-07	mg/kg/day	2.0E+00	mg/kg/day	6.9E-07	NA	NA	NA	NA	NA
				Dieldrin	3.5E-03	mg/kg	5.4E-09	mg/kg/day	1.6E+01	mg/kg/day	8.7E-08	NA	NA	NA	NA	NA
				Heptachlor	1.7E-02	mg/kg	2.7E-08	mg/kg/day	4.5E+00	mg/kg/day	1.2E-07	NA	NA	NA	NA	NA
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	2.1E-06	mg/kg/day	3.0E-02	mg/kg/day	6.3E-08	NA	NA	NA	NA	NA
				Aluminum	2.6E+04	mg/kg	4.1E-02	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Antimony	6.9E-01	mg/kg	1.1E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Arsenic	1.7E+01	mg/kg	2.6E-05	mg/kg/day	1.5E+00	mg/kg/day	3.9E-05	NA	NA	NA	NA	NA
				Cadmium	8.1E+01	mg/kg	1.3E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Chromium[1]	1.7E+01	mg/kg			5.0E-01	mg/kg/day	5.8E-05	NA	NA	NA	NA	NA
				Cobalt	2.9E+00	mg/kg	4.5E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Copper	9.0E+02	mg/kg	1.4E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Iron	1.2E+04	mg/kg	1.8E-02	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Manganese	2.4E+02	mg/kg	3.7E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Mercury	2.1E-01	mg/kg	3.2E-07	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Vanadium	1.9E+01	mg/kg	2.9E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								1.2E-04					NA

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	1.0E-07	mg/kg/day	3.1E-01	mg/kg/day	3.2E-08	NA	NA	NA	NA	NA
				Benzo(a)anthracene[1]	7.0E-02	mg/kg			7.3E-01	mg/kg/day	1.7E-07	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	1.1E-01	mg/kg			7.3E+00	mg/kg/day	2.8E-06	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	9.0E-02	mg/kg			7.3E-01	mg/kg/day	2.2E-07	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	8.5E-02	mg/kg			7.3E-02	mg/kg/day	2.1E-08	NA	NA	NA	NA	NA
				Chrysene[1]	8.6E-02	mg/kg			7.3E-03	mg/kg/day	2.1E-09	NA	NA	NA	NA	NA
				Dibenz(a,h)anthracene[1]	4.5E-02	mg/kg			7.3E+00	mg/kg/day	1.1E-06	NA	NA	NA	NA	NA
				Indeno(1,2,3-cd)pyrene[1]	1.5E-01	mg/kg			7.3E-01	mg/kg/day	3.7E-07	NA	NA	NA	NA	NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	4.6E-08	mg/kg/day	7.0E+00	mg/kg/day	3.2E-07	NA	NA	NA	NA	NA
				alpha-BHC	3.9E-02	mg/kg	1.9E-08	mg/kg/day	6.3E+00	mg/kg/day	1.2E-07	NA	NA	NA	NA	NA
				Aroclor-1254	3.2E+00	mg/kg	2.2E-06	mg/kg/day	2.0E+00	mg/kg/day	4.4E-06	NA	NA	NA	NA	NA
				Aroclor-1260	2.2E-01	mg/kg	1.5E-07	mg/kg/day	2.0E+00	mg/kg/day	3.0E-07	NA	NA	NA	NA	NA
				Dieldrin	3.5E-03	mg/kg	1.7E-09	mg/kg/day	1.6E+01	mg/kg/day	2.7E-08	NA	NA	NA	NA	NA
				Heptachlor	1.7E-02	mg/kg	8.4E-09	mg/kg/day	4.5E+00	mg/kg/day	3.8E-08	NA	NA	NA	NA	NA
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	6.4E-09	NA	NA	NA	NA	NA
				Aluminum	2.6E+04	mg/kg	1.3E-03	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Antimony	6.9E-01	mg/kg	3.4E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Arsenic	1.7E+01	mg/kg	2.5E-06	mg/kg/day	1.5E+00	mg/kg/day	3.7E-06	NA	NA	NA	NA	NA
				Cadmium	8.1E+01	mg/kg	4.0E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Chromium[1]	1.7E+01	mg/kg			2.0E+01	mg/kg/day	9.1E-05	NA	NA	NA	NA	NA
				Cobalt	2.9E+00	mg/kg	1.4E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Copper	9.0E+02	mg/kg	4.5E-05	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Iron	1.2E+04	mg/kg	5.7E-04	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Manganese	2.4E+02	mg/kg	1.2E-05	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Mercury	2.1E-01	mg/kg	1.0E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Vanadium	1.9E+01	mg/kg	9.2E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
			Exp. Route Total								1.0E-04					NA
		Exposure Point Total									2.2E-04					NA
	Exposure Medium Total										2.2E-04					NA
	Air	Emissions from Soil Across Site	Inhalation	Chromium[1]	1.3E-08	mg/m^3			8.4E-02	(ug/m3)$^{-1}$	1.1E-06	NA	NA	NA	NA	NA
			Exp. Route Total								1.1E-06					NA
		Exposure Point Total									1.1E-06					NA
	Exposure Medium Total										1.1E-06					NA
Soil* Across Site											2.2E-04					NA

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil Outside Waste Area	Ingestion	Benzo(a)anthracene[1]	7.2E-02	mg/kg			7.3E-01	mg/kg/day	3.5E-07	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	9.8E-02	mg/kg			7.3E+00	mg/kg/day	4.8E-06	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	9.6E-02	mg/kg			7.3E-01	mg/kg/day	4.7E-07	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	9.3E-02	mg/kg			7.3E-02	mg/kg/day	4.5E-08	NA	NA	NA	NA	NA
				Chrysene[1]	8.9E-02	mg/kg			7.3E-03	mg/kg/day	4.4E-09	NA	NA	NA	NA	NA
				Dibenz(a,h)anthracene[1]	4.5E-02	mg/kg			7.3E+00	mg/kg/day	2.2E-06	NA	NA	NA	NA	NA
				Indeno(1,2,3-cd)pyrene[1]	1.5E-01	mg/kg			7.3E-01	mg/kg/day	7.3E-07	NA	NA	NA	NA	NA
				Aluminum	7.0E+03	mg/kg	1.1E-02	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Antimony	7.6E-01	mg/kg	1.2E-06	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Arsenic	2.1E+01	mg/kg	3.2E-05	mg/kg/day	1.5E+00	mg/kg/day	4.8E-05	NA	NA	NA	NA	NA
				Chromium[1]	1.4E+01	mg/kg			5.0E-01	mg/kg/day	4.6E-05	NA	NA	NA	NA	NA
				Cobalt	2.8E+00	mg/kg	4.4E-06	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Iron	1.0E+04	mg/kg	1.6E-02	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Manganese	1.3E+02	mg/kg	2.1E-04	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Mercury	2.4E-01	mg/kg	3.7E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Vanadium	1.9E+01	mg/kg	2.9E-05	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
			Exp. Route Total								1.0E-04					NA
			Dermal Absorption	Benzo(a)anthracene[1]	7.2E-02	mg/kg			7.3E-01	mg/kg/day	1.8E-07	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	9.8E-02	mg/kg			7.3E+00	mg/kg/day	2.4E-06	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	9.6E-02	mg/kg			7.3E-01	mg/kg/day	2.4E-07	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	9.3E-02	mg/kg			7.3E-02	mg/kg/day	2.3E-08	NA	NA	NA	NA	NA
				Chrysene[1]	8.9E-02	mg/kg			7.3E-03	mg/kg/day	2.2E-09	NA	NA	NA	NA	NA
				Dibenz(a,h)anthracene[1]	4.5E-02	mg/kg			7.3E+00	mg/kg/day	1.1E-06	NA	NA	NA	NA	NA
				Indeno(1,2,3-cd)pyrene[1]	1.5E-01	mg/kg			7.3E-01	mg/kg/day	3.7E-07	NA	NA	NA	NA	NA
				Aluminum	7.0E+03	mg/kg	3.4E-04	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Antimony	7.6E-01	mg/kg	3.8E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Arsenic	2.1E+01	mg/kg	3.1E-06	mg/kg/day	1.5E+00	mg/kg/day	4.6E-06	NA	NA	NA	NA	NA
				Chromium[1]	1.4E+01	mg/kg			2.0E+01	mg/kg/day	7.2E-05	NA	NA	NA	NA	NA
				Cobalt	2.8E+00	mg/kg	1.4E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Iron	1.0E+04	mg/kg	5.0E-04	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Manganese	1.3E+02	mg/kg	6.6E-06	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Mercury	2.4E-01	mg/kg	1.2E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Vanadium	1.9E+01	mg/kg	9.3E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
			Exp. Route Total								8.1E-05					NA
		Exposure Point Total									1.8E-04					NA
	Exposure Medium Total										1.8E-04					NA
	Air	Emissions from Soil Outside Waste Area	Inhalation	Chromium[1]	1.0E-08	mg/m^3			8.4E-02	(ug/m3)$^{-1}$	8.8E-07	NA	NA	NA	NA	NA
			Exp. Route Total								8.8E-07					NA
		Exposure Point Total									8.8E-07					NA
	Exposure Medium Total										8.8E-07					NA
Soil* Outside Waste Area											1.8E-04					NA

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Sludge Area	Ingestion	Chromium[1]	6.9E+00	mg/kg			5.0E-01	mg/kg/day	2.3E-05	NA	NA	NA	NA	NA
				Cobalt	8.7E+00	mg/kg	1.4E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Iron	5.8E+03	mg/kg	9.1E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Manganese	2.5E+02	mg/kg	3.8E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								2.3E-05					NA
			Dermal Absorption	Chromium[1]	6.9E+00	mg/kg			2.0E+01	mg/kg/day	3.6E-05	NA	NA	NA	NA	NA
				Cobalt	8.7E+00	mg/kg	4.3E-07	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Iron	5.8E+03	mg/kg	2.9E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Manganese	2.5E+02	mg/kg	1.2E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								3.6E-05					NA
		Exposure Point Total									5.9E-05					NA
	Exposure Medium Total										5.9E-05					NA
Soil* in Sludge Area											5.9E-05					NA
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Ingestion	Heptachlor epoxide	2.7E-02	ug/L	4.1E-07	mg/kg/day	9.1E+00	mg/kg/day	3.7E-06	NA	NA	NA	NA	NA
				RDX	1.8E+00	ug/L	2.7E-05	mg/kg/day	1.1E-01	mg/kg/day	2.9E-06	NA	NA	NA	NA	NA
			Exp. Route Total								6.6E-06					NA
			Dermal Absorption	Heptachlor epoxide	2.7E-02	ug/L	6.3E-07	mg/kg/day	9.1E+00	mg/kg/day	5.7E-06	NA	NA	NA	NA	NA
				RDX	1.8E+00	ug/L	2.3E-07	mg/kg/day	1.1E-01	mg/kg/day	2.5E-08	NA	NA	NA	NA	NA
			Exp. Route Total								5.7E-06					NA
		Exposure Point Total									1.2E-05					NA
	Exposure Medium Total										1.2E-05					NA
Shallow Aquifer Groundwater Total											**1.2E-05**					NA
Groundwater	Groundwater	Yorktown-Eastover Deep Aquifer Tap Water	Ingestion	Heptachlor epoxide	9.8E-03	ug/L	1.5E-07	mg/kg/day	9.1E+00	mg/kg/day	1.3E-06	NA	NA	NA	NA	NA
				Manganese	1.1E+02	ug/L	1.7E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								1.3E-06					NA
			Dermal Absorption	Heptachlor epoxide	9.8E-03	ug/L	2.3E-07	mg/kg/day	9.1E+00	mg/kg/day	2.1E-06	NA	NA	NA	NA	NA
				Manganese	1.1E+02	ug/L	NA		NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								2.1E-06					NA
		Exposure Point Total									3.4E-06					NA
	Exposure Medium Total										3.4E-06					NA
Deep Aquifer Groundwater Total											3.4E-06					NA
										Total of Receptor Risks Across All Media	2.7E-04				Total of Receptor Hazards Across All Media	NA

Notes-

bold indicates soil area and groundwater aquifer with greatest risk

NA = Not applicable.

Total is maximum of soil (in waste area, outside waste area, across site, or sludge area) and groundwater (shallow or deep).

1. See Table 7.6.RME Supplement A for calculation of intake and cancer risk following MMOA method.

TABLE 7.6.RME Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
							Value				Units	Value				Units	
					Value	Units	0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Soil*	Soil*	Soil in Waste Area	Ingestion	Benzo(a)anthracene	4.2E-02	mg/kg	1.5E-08	3.1E-08	8.2E-09	1.2E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	2.1E-07
				Benzo(a)pyrene	4.0E-02	mg/kg	1.5E-08	2.9E-08	7.8E-09	1.1E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	2.0E-06
				Benzo(b)fluoranthene	5.6E-02	mg/kg	2.0E-08	4.1E-08	1.1E-08	1.5E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	2.7E-07
				Benzo(k)fluoranthene	4.6E-02	mg/kg	1.7E-08	3.4E-08	9.0E-09	1.3E-08	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	mg/kg/day	2.3E-08
				Chrysene	5.0E-02	mg/kg	1.8E-08	3.7E-08	9.8E-09	1.4E-08	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	mg/kg/day	2.4E-09
				Chromium	2.1E+01	mg/kg	7.8E-06	1.6E-05	4.2E-06	5.8E-06	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	mg/kg/day	7.1E-05
			Dermal	Benzo(a)anthracene	4.2E-02	mg/kg	5.6E-09	1.1E-08	1.2E-08	1.7E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	1.0E-07
				Benzo(a)pyrene	4.0E-02	mg/kg	5.3E-09	1.1E-08	1.2E-08	1.6E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	9.9E-07
				Benzo(b)fluoranthene	5.6E-02	mg/kg	7.4E-09	1.5E-08	1.6E-08	2.3E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	1.4E-07
				Benzo(k)fluoranthene	4.6E-02	mg/kg	6.1E-09	1.2E-08	1.3E-08	1.9E-08	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	mg/kg/day	1.1E-08
				Chrysene	5.0E-02	mg/kg	6.6E-09	1.3E-08	1.5E-08	2.0E-08	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	mg/kg/day	1.2E-09
				Chromium	2.1E+01	mg/kg	2.2E-07	4.3E-07	4.7E-07	6.6E-07	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	mg/kg/day	1.1E-04
	Air	Emissions from Soil in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3	4.3E-10	8.6E-10	2.1E-09	3.0E-09	mg/m^3	8.4E-01	2.5E-01	2.5E-01	8.4E-02	$1/ug/m^3$	1.4E-06
Soil*	Soil*	Soil Across Site	Ingestion	Benzo(a)anthracene	7.0E-02	mg/kg	2.6E-08	5.1E-08	1.4E-08	1.9E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	3.4E-07
				Benzo(a)pyrene	1.1E-01	mg/kg	4.1E-08	8.3E-08	2.2E-08	3.1E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	5.5E-06
				Benzo(b)fluoranthene	9.0E-02	mg/kg	3.3E-08	6.6E-08	1.8E-08	2.5E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	4.4E-07
				Benzo(k)fluoranthene	8.5E-02	mg/kg	3.1E-08	6.2E-08	1.7E-08	2.3E-08	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	mg/kg/day	4.2E-08
				Chrysene	8.6E-02	mg/kg	3.1E-08	6.3E-08	1.7E-08	2.3E-08	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	mg/kg/day	4.2E-09
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-08	3.3E-08	8.8E-09	1.2E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	2.2E-06
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.5E-08	1.1E-07	2.9E-08	4.1E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	7.3E-07
				Chromium	1.7E+01	mg/kg	6.3E-06	1.3E-05	3.4E-06	4.7E-06	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	mg/kg/day	5.8E-05
			Dermal	Benzo(a)anthracene	7.0E-02	mg/kg	9.3E-09	1.9E-08	2.0E-08	2.8E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	1.7E-07
				Benzo(a)pyrene	1.1E-01	mg/kg	1.5E-08	3.0E-08	3.3E-08	4.6E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	2.8E-06
				Benzo(b)fluoranthene	9.0E-02	mg/kg	1.2E-08	2.4E-08	2.6E-08	3.6E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	2.2E-07
				Benzo(k)fluoranthene	8.5E-02	mg/kg	1.1E-08	2.3E-08	2.5E-08	3.5E-08	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	mg/kg/day	2.1E-08
				Chrysene	8.6E-02	mg/kg	1.1E-08	2.3E-08	2.5E-08	3.5E-08	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	mg/kg/day	2.1E-09
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	6.0E-09	1.2E-08	1.3E-08	1.8E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	1.1E-06
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	2.0E-08	4.0E-08	4.4E-08	6.1E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	3.7E-07
				Chromium	1.7E+01	mg/kg	1.8E-07	3.5E-07	3.9E-07	5.4E-07	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	mg/kg/day	9.1E-05
	Air	Emissions from Soil* Across Site	Inhalation	Chromium	1.3E-08	mg/m^3	3.5E-10	7.0E-10	1.7E-09	2.4E-09	mg/m^3	8.4E-01	2.5E-01	2.5E-01	8.4E-02	$1/ug/m^3$	1.1E-06

TABLE 7.6.RME Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Soil*	Soil*	Soil Outside Waste Area	Ingestion	Benzo(a)anthracene	7.2E-02	mg/kg	2.6E-08	5.2E-08	1.4E-08	2.0E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	3.5E-07
				Benzo(a)pyrene	9.8E-02	mg/kg	3.6E-08	7.2E-08	1.9E-08	2.7E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	4.8E-06
				Benzo(b)fluoranthene	9.6E-02	mg/kg	3.5E-08	7.0E-08	1.9E-08	2.6E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	4.7E-07
				Benzo(k)fluoranthene	9.3E-02	mg/kg	3.4E-08	6.8E-08	1.8E-08	2.5E-08	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	mg/kg/day	4.5E-08
				Chrysene	8.9E-02	mg/kg	3.3E-08	6.5E-08	1.7E-08	2.4E-08	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	mg/kg/day	4.4E-09
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-08	3.3E-08	8.8E-09	1.2E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	2.2E-06
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.5E-08	1.1E-07	2.9E-08	4.1E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	7.3E-07
				Chromium	1.4E+01	mg/kg	5.0E-06	1.0E-05	2.7E-06	3.7E-06	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	mg/kg/day	4.6E-05
			Dermal	Benzo(a)anthracene	7.2E-02	mg/kg	9.5E-09	1.9E-08	2.1E-08	2.9E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	1.8E-07
				Benzo(a)pyrene	9.8E-02	mg/kg	1.3E-08	2.6E-08	2.8E-08	4.0E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	2.4E-06
				Benzo(b)fluoranthene	9.6E-02	mg/kg	1.3E-08	2.6E-08	2.8E-08	3.9E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	2.4E-07
				Benzo(k)fluoranthene	9.3E-02	mg/kg	1.2E-08	2.5E-08	2.7E-08	3.8E-08	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	mg/kg/day	2.3E-08
				Chrysene	8.9E-02	mg/kg	1.2E-08	2.4E-08	2.6E-08	3.6E-08	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	mg/kg/day	2.2E-09
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	6.0E-09	1.2E-08	1.3E-08	1.8E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	mg/kg/day	1.1E-06
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	2.0E-08	4.0E-08	4.4E-08	6.1E-08	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	mg/kg/day	3.7E-07
				Chromium	1.4E+01	mg/kg	1.4E-07	2.8E-07	3.1E-07	4.3E-07	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	mg/kg/day	7.2E-05
	Air	Emissions from Soil Outside Waste Area	Inhalation	Chromium	1.0E-08	mg/m^3	2.8E-10	5.5E-10	1.4E-09	1.9E-09	mg/m^3	8.4E-01	2.5E-01	2.5E-01	8.4E-02	$1/ug/m^3$	8.8E-07
Soil*	Soil*	Soil in Sludge Area	Ingestion	Chromium	6.9E+00	mg/kg	2.5E-06	5.0E-06	1.4E-06	1.9E-06	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	mg/kg/day	2.3E-05
			Dermal	Chromium	6.9E+00	mg/kg	7.1E-08	1.4E-07	1.5E-07	2.2E-07	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	mg/kg/day	3.6E-05

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion	2,4-Dinitrotoluene	2.1E+00	mg/kg	7.0E-08	mg/kg/day	3.1E-01	mg/kg/day	2.2E-08	4.9E-06	mg/kg/day	2.0E-03	mg/kg/day	2.5E-03
				Benzo(a)anthracene	4.2E-02	mg/kg	1.4E-09	mg/kg/day	7.3E-01	mg/kg/day	1.0E-09	9.9E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	1.3E-09	mg/kg/day	7.3E+00	mg/kg/day	9.8E-09	9.4E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	1.9E-09	mg/kg/day	7.3E-01	mg/kg/day	1.4E-09	1.3E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	1.5E-09	mg/kg/day	7.3E-02	mg/kg/day	1.1E-10	1.1E-07	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	1.7E-09	mg/kg/day	7.3E-03	mg/kg/day	1.2E-11	1.2E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	3.1E-09	mg/kg/day	7.0E+00	mg/kg/day	2.2E-08	2.2E-07	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	1.0E-08	mg/kg/day	6.3E+00	mg/kg/day	6.5E-08	7.2E-07	mg/kg/day	8.0E-03	mg/kg/day	9.1E-05
				Aroclor-1254	1.2E+01	mg/kg	3.9E-07	mg/kg/day	2.0E+00	mg/kg/day	7.8E-07	2.7E-05	mg/kg/day	3.0E-05	mg/kg/day	9.1E-01
				Aroclor-1260	7.4E-01	mg/kg	2.5E-08	mg/kg/day	2.0E+00	mg/kg/day	5.0E-08	1.7E-06	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	1.3E-09	mg/kg/day	1.6E+01	mg/kg/day	2.1E-08	9.3E-08	mg/kg/day	1.0E-04	mg/kg/day	9.3E-04
				Heptachlor	1.4E-01	mg/kg	4.7E-09	mg/kg/day	4.5E+00	mg/kg/day	2.1E-08	3.3E-07	mg/kg/day	1.0E-04	mg/kg/day	3.3E-03
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	1.4E-07	mg/kg/day	3.0E-02	mg/kg/day	4.1E-09	9.6E-06	mg/kg/day	5.0E-04	mg/kg/day	1.9E-02
				Aluminum	9.0E+04	mg/kg	3.0E-03	mg/kg/day	NA		NA	2.1E-01	mg/kg/day	1.0E+00	mg/kg/day	2.1E-01
				Arsenic	2.9E+00	mg/kg	9.7E-08	mg/kg/day	1.5E+00	mg/kg/day	1.5E-07	6.8E-06	mg/kg/day	3.0E-04	mg/kg/day	2.3E-02
				Cadmium	5.0E+02	mg/kg	1.7E-05	mg/kg/day	NA		NA	1.2E-03	mg/kg/day	1.0E-03	mg/kg/day	1.2E+00
				Chromium	2.1E+01	mg/kg	7.1E-07	mg/kg/day	5.0E-01	mg/kg/day	3.6E-07	5.0E-05	mg/kg/day	2.0E-02	mg/kg/day	2.5E-03
				Cobalt	5.2E+00	mg/kg	1.7E-07	mg/kg/day	NA		NA	1.2E-05	mg/kg/day	3.0E-03	mg/kg/day	4.0E-03
				Copper	5.2E+03	mg/kg	1.7E-04	mg/kg/day	NA		NA	1.2E-02	mg/kg/day	1.0E-02	mg/kg/day	1.2E+00
				Iron	1.1E+04	mg/kg	3.6E-04	mg/kg/day	NA		NA	2.5E-02	mg/kg/day	7.0E-01	mg/kg/day	3.6E-02
				Manganese	7.5E+02	mg/kg	2.5E-05	mg/kg/day	NA		NA	1.8E-03	mg/kg/day	1.4E-01	mg/kg/day	1.3E-02
				Vanadium	3.4E+01	mg/kg	1.1E-06	mg/kg/day	NA		NA	7.9E-05	mg/kg/day	5.0E-03	mg/kg/day	1.6E-02
			Exp. Route Total								1.5E-06					3.6E+00
			Dermal Absorption	2,4-Dinitrotoluene	2.1E+00	mg/kg	1.5E-08	mg/kg/day	3.1E-01	mg/kg/day	4.5E-09	1.0E-06	mg/kg/day	2.0E-03	mg/kg/day	5.1E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	3.8E-10	mg/kg/day	7.3E-01	mg/kg/day	2.8E-10	2.6E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	3.6E-10	mg/kg/day	7.3E+00	mg/kg/day	2.6E-09	2.5E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	5.0E-10	mg/kg/day	7.3E-01	mg/kg/day	3.7E-10	3.5E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	4.1E-10	mg/kg/day	7.3E-02	mg/kg/day	3.0E-11	2.9E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	4.5E-10	mg/kg/day	7.3E-03	mg/kg/day	3.3E-12	3.1E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	6.4E-10	mg/kg/day	7.0E+00	mg/kg/day	4.5E-09	4.5E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	2.1E-09	mg/kg/day	6.3E+00	mg/kg/day	1.3E-08	1.5E-07	mg/kg/day	8.0E-03	mg/kg/day	1.9E-05
				Aroclor-1254	1.2E+01	mg/kg	1.1E-07	mg/kg/day	2.0E+00	mg/kg/day	2.2E-07	7.9E-06	mg/kg/day	3.0E-05	mg/kg/day	2.6E-01
				Aroclor-1260	7.4E-01	mg/kg	7.2E-09	mg/kg/day	2.0E+00	mg/kg/day	1.4E-08	5.0E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	2.8E-10	mg/kg/day	1.6E+01	mg/kg/day	4.4E-09	1.9E-08	mg/kg/day	1.0E-04	mg/kg/day	1.9E-04
				Heptachlor	1.4E-01	mg/kg	9.7E-10	mg/kg/day	4.5E+00	mg/kg/day	4.4E-09	6.8E-08	mg/kg/day	1.0E-04	mg/kg/day	6.8E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	9.1E-09	mg/kg/day	3.0E-02	mg/kg/day	2.7E-10	6.4E-07	mg/kg/day	5.0E-04	mg/kg/day	1.3E-03
				Aluminum	9.0E+04	mg/kg	6.2E-05	mg/kg/day	NA		NA	4.4E-03	mg/kg/day	1.0E+00	mg/kg/day	4.4E-03
				Arsenic	2.9E+00	mg/kg	6.0E-09	mg/kg/day	1.5E+00	mg/kg/day	9.0E-09	4.2E-07	mg/kg/day	3.0E-04	mg/kg/day	1.4E-03
				Cadmium	5.0E+02	mg/kg	3.5E-08	mg/kg/day	NA		NA	2.4E-06	mg/kg/day	2.5E-05	mg/kg/day	9.8E-02

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Chromium	2.1E+01	mg/kg	1.5E-08	mg/kg/day	2.0E+01	mg/kg/day	2.9E-07	1.0E-06	mg/kg/day	5.0E-04	mg/kg/day	2.1E-03
				Cobalt	5.2E+00	mg/kg	3.6E-09	mg/kg/day	NA		NA	2.5E-07	mg/kg/day	3.0E-03	mg/kg/day	8.3E-05
				Copper	5.2E+03	mg/kg	3.6E-06	mg/kg/day	NA		NA	2.5E-04	mg/kg/day	1.0E-02	mg/kg/day	2.5E-02
				Iron	1.1E+04	mg/kg	7.4E-06	mg/kg/day	NA		NA	5.2E-04	mg/kg/day	7.0E-01	mg/kg/day	7.4E-04
				Manganese	7.5E+02	mg/kg	5.2E-07	mg/kg/day	NA		NA	3.6E-05	mg/kg/day	1.4E-01	mg/kg/day	2.6E-04
				Vanadium	3.4E+01	mg/kg	2.3E-08	mg/kg/day	NA		NA	1.6E-06	mg/kg/day	5.0E-03	mg/kg/day	3.3E-04
			Exp. Route Total								5.8E-07					4.0E-01
		Exposure Point Total									2.1E-06					4.0E+00
	Exposure Medium Total										2.1E-06					4.0E+00
	Air	Emissions from Soil* in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3	2.5E-11	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	2.1E-09	1.8E-09	mg/m^3	1.0E-04	mg/m^3	1.8E-05
			Exp. Route Total								2.1E-09					1.8E-05
		Exposure Point Total									2.1E-09					1.8E-05
	Exposure Medium Total										2.1E-09					1.8E-05
Soil* In Waste Area											**2.1E-06**					**4.0E+00**
Soil*	Soil*	Soil Across Site	Ingestion	2,4-Dinitrotoluene	2.1E-01	mg/kg	7.0E-09	mg/kg/day	3.1E-01	mg/kg/day	2.2E-09	4.9E-07	mg/kg/day	2.0E-03	mg/kg/day	2.4E-04
				Benzo(a)anthracene	7.0E-02	mg/kg	2.3E-09	mg/kg/day	7.3E-01	mg/kg/day	1.7E-09	1.6E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	3.8E-09	mg/kg/day	7.3E+00	mg/kg/day	2.8E-08	2.7E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	3.0E-09	mg/kg/day	7.3E-01	mg/kg/day	2.2E-09	2.1E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	2.9E-09	mg/kg/day	7.3E-02	mg/kg/day	2.1E-10	2.0E-07	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	2.9E-09	mg/kg/day	7.3E-03	mg/kg/day	2.1E-11	2.0E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.5E-09	mg/kg/day	7.3E+00	mg/kg/day	1.1E-08	1.1E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.0E-09	mg/kg/day	7.3E-01	mg/kg/day	3.7E-09	3.5E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	3.1E-09	mg/kg/day	7.0E+00	mg/kg/day	2.2E-08	2.2E-07	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	1.3E-09	mg/kg/day	6.3E+00	mg/kg/day	8.3E-09	9.2E-08	mg/kg/day	8.0E-03	mg/kg/day	1.2E-05
				Aroclor-1254	3.2E+00	mg/kg	1.1E-07	mg/kg/day	2.0E+00	mg/kg/day	2.1E-07	7.5E-06	mg/kg/day	3.0E-05	mg/kg/day	2.5E-01
				Aroclor-1260	2.2E-01	mg/kg	7.4E-09	mg/kg/day	2.0E+00	mg/kg/day	1.5E-08	5.2E-07	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	1.2E-10	mg/kg/day	1.6E+01	mg/kg/day	1.9E-09	8.2E-09	mg/kg/day	1.0E-04	mg/kg/day	8.2E-05
				Heptachlor	1.7E-02	mg/kg	5.7E-10	mg/kg/day	4.5E+00	mg/kg/day	2.6E-09	4.0E-08	mg/kg/day	1.0E-04	mg/kg/day	4.0E-04
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	4.5E-08	mg/kg/day	3.0E-02	mg/kg/day	1.3E-09	3.1E-06	mg/kg/day	5.0E-04	mg/kg/day	6.3E-03
				Aluminum	2.6E+04	mg/kg	8.7E-04	mg/kg/day	NA		NA	6.1E-02	mg/kg/day	1.0E+00	mg/kg/day	6.1E-02
				Antimony	6.9E-01	mg/kg	2.3E-08	mg/kg/day	NA		NA	1.6E-06	mg/kg/day	4.0E-04	mg/kg/day	4.1E-03
				Arsenic	1.7E+01	mg/kg	5.5E-07	mg/kg/day	1.5E+00	mg/kg/day	8.3E-07	3.9E-05	mg/kg/day	3.0E-04	mg/kg/day	1.3E-01
				Cadmium	8.1E+01	mg/kg	2.7E-06	mg/kg/day	NA		NA	1.9E-04	mg/kg/day	1.0E-03	mg/kg/day	1.9E-01
				Chromium	1.7E+01	mg/kg	5.8E-07	mg/kg/day	5.0E-01	mg/kg/day	2.9E-07	4.1E-05	mg/kg/day	2.0E-02	mg/kg/day	2.0E-03
				Cobalt	2.9E+00	mg/kg	9.6E-08	mg/kg/day	NA		NA	6.7E-06	mg/kg/day	3.0E-03	mg/kg/day	2.2E-03
				Copper	9.0E+02	mg/kg	3.0E-05	mg/kg/day	NA		NA	2.1E-03	mg/kg/day	1.0E-02	mg/kg/day	2.1E-01
				Iron	1.2E+04	mg/kg	3.9E-04	mg/kg/day	NA		NA	2.7E-02	mg/kg/day	7.0E-01	mg/kg/day	3.9E-02
				Manganese	2.4E+02	mg/kg	8.0E-06	mg/kg/day	NA		NA	5.6E-04	mg/kg/day	1.4E-01	mg/kg/day	4.0E-03

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Ingestion	Mercury	2.1E-01	mg/kg	6.9E-09	mg/kg/day	NA		NA	4.8E-07	mg/kg/day	1.0E-04	mg/kg/day	4.8E-03
				Vanadium	1.9E+01	mg/kg	6.2E-07	mg/kg/day	NA		NA	4.4E-05	mg/kg/day	5.0E-03	mg/kg/day	8.7E-03
			Exp. Route Total								1.4E-06					9.1E-01
			Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	1.4E-09	mg/kg/day	3.1E-01	mg/kg/day	4.5E-10	1.0E-07	mg/kg/day	2.0E-03	mg/kg/day	5.0E-05
				Benzo(a)anthracene	7.0E-02	mg/kg	6.3E-10	mg/kg/day	7.3E-01	mg/kg/day	4.6E-10	4.4E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	1.0E-09	mg/kg/day	7.3E+00	mg/kg/day	7.4E-09	7.1E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	8.1E-10	mg/kg/day	7.3E-01	mg/kg/day	5.9E-10	5.6E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	7.7E-10	mg/kg/day	7.3E-02	mg/kg/day	5.6E-11	5.4E-08	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	7.7E-10	mg/kg/day	7.3E-03	mg/kg/day	5.6E-12	5.4E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	4.0E-10	mg/kg/day	7.3E+00	mg/kg/day	3.0E-09	2.8E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	1.3E-09	mg/kg/day	7.3E-01	mg/kg/day	9.8E-10	9.4E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	6.4E-10	mg/kg/day	7.0E+00	mg/kg/day	4.5E-09	4.5E-08	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	2.7E-10	mg/kg/day	6.3E+00	mg/kg/day	1.7E-09	1.9E-08	mg/kg/day	8.0E-03	mg/kg/day	2.4E-06
				Aroclor-1254	3.2E+00	mg/kg	3.1E-08	mg/kg/day	2.0E+00	mg/kg/day	6.2E-08	2.2E-06	mg/kg/day	3.0E-05	mg/kg/day	7.2E-02
				Aroclor-1260	2.2E-01	mg/kg	2.1E-09	mg/kg/day	2.0E+00	mg/kg/day	4.3E-09	1.5E-07	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	2.4E-11	mg/kg/day	1.6E+01	mg/kg/day	3.8E-10	1.7E-09	mg/kg/day	1.0E-04	mg/kg/day	1.7E-05
				Heptachlor	1.7E-02	mg/kg	1.2E-10	mg/kg/day	4.5E+00	mg/kg/day	5.3E-10	8.2E-09	mg/kg/day	1.0E-04	mg/kg/day	8.2E-05
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	3.0E-09	mg/kg/day	3.0E-02	mg/kg/day	8.9E-11	2.1E-07	mg/kg/day	5.0E-04	mg/kg/day	4.2E-04
				Aluminum	2.6E+04	mg/kg	1.8E-05	mg/kg/day	NA		NA	1.3E-03	mg/kg/day	1.0E+00	mg/kg/day	1.3E-03
				Antimony	6.9E-01	mg/kg	4.8E-10	mg/kg/day	NA		NA	3.4E-08	mg/kg/day	6.0E-05	mg/kg/day	5.6E-04
				Arsenic	1.7E+01	mg/kg	3.4E-08	mg/kg/day	1.5E+00	mg/kg/day	5.1E-08	2.4E-06	mg/kg/day	3.0E-04	mg/kg/day	8.0E-03
				Cadmium	8.1E+01	mg/kg	5.6E-09	mg/kg/day	NA		NA	3.9E-07	mg/kg/day	2.5E-05	mg/kg/day	1.6E-02
				Chromium	1.7E+01	mg/kg	1.2E-08	mg/kg/day	2.0E+01	mg/kg/day	2.4E-07	8.4E-07	mg/kg/day	5.0E-04	mg/kg/day	1.7E-03
				Cobalt	2.9E+00	mg/kg	2.0E-09	mg/kg/day	NA		NA	1.4E-07	mg/kg/day	3.0E-03	mg/kg/day	4.6E-05
				Copper	9.0E+02	mg/kg	6.2E-07	mg/kg/day	NA		NA	4.4E-05	mg/kg/day	1.0E-02	mg/kg/day	4.4E-03
				Iron	1.2E+04	mg/kg	8.0E-06	mg/kg/day	NA		NA	5.6E-04	mg/kg/day	7.0E-01	mg/kg/day	8.0E-04
				Manganese	2.4E+02	mg/kg	1.7E-07	mg/kg/day	NA		NA	1.2E-05	mg/kg/day	1.4E-01	mg/kg/day	8.3E-05
				Mercury	2.1E-01	mg/kg	1.4E-10	mg/kg/day	NA		NA	1.0E-08	mg/kg/day	1.0E-04	mg/kg/day	1.0E-04
				Vanadium	1.9E+01	mg/kg	1.3E-08	mg/kg/day	NA		NA	9.0E-07	mg/kg/day	5.0E-03	mg/kg/day	1.8E-04
			Exp. Route Total								3.8E-07					1.1E-01
		Exposure Point Total									1.8E-06					1.0E+00
	Exposure Medium Total										1.8E-06					1.0E+00
	Air	Emissions from Soil Across Site	Inhalation	Chromium	1.3E-08	mg/m^3	2.1E-11	mg/m^3	8.4E-02	(ug/m3)$^{-1}$	1.7E-09	1.5E-09	mg/m^3	1.0E-04	mg/m^3	1.5E-05
			Exp. Route Total								1.7E-09					1.5E-05
		Exposure Point Total									1.7E-09					1.5E-05
	Exposure Medium Total										1.7E-09					1.5E-05
Soil* Across Site											1.8E-06					1.0E+00

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.2E-02	mg/kg	2.4E-09	mg/kg/day	7.3E-01	mg/kg/day	1.8E-09	1.7E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	3.3E-09	mg/kg/day	7.3E+00	mg/kg/day	2.4E-08	2.3E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	3.2E-09	mg/kg/day	7.3E-01	mg/kg/day	2.4E-09	2.3E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	3.1E-09	mg/kg/day	7.3E-02	mg/kg/day	2.3E-10	2.2E-07	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	3.0E-09	mg/kg/day	7.3E-03	mg/kg/day	2.2E-11	2.1E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.5E-09	mg/kg/day	7.3E+00	mg/kg/day	1.1E-08	1.1E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.0E-09	mg/kg/day	7.3E-01	mg/kg/day	3.7E-09	3.5E-07	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	2.3E-04	mg/kg/day	NA		NA	1.6E-02	mg/kg/day	1.0E+00	mg/kg/day	1.6E-02
				Antimony	7.6E-01	mg/kg	2.6E-08	mg/kg/day	NA		NA	1.8E-06	mg/kg/day	4.0E-04	mg/kg/day	4.5E-03
				Arsenic	2.1E+01	mg/kg	6.9E-07	mg/kg/day	1.5E+00	mg/kg/day	1.0E-06	4.8E-05	mg/kg/day	3.0E-04	mg/kg/day	1.6E-01
				Chromium	1.4E+01	mg/kg	4.6E-07	mg/kg/day	5.0E-01	mg/kg/day	2.3E-07	3.2E-05	mg/kg/day	2.0E-02	mg/kg/day	1.6E-03
				Cobalt	2.8E+00	mg/kg	9.4E-08	mg/kg/day	NA		NA	6.6E-06	mg/kg/day	3.0E-03	mg/kg/day	2.2E-03
				Iron	1.0E+04	mg/kg	3.4E-04	mg/kg/day	NA		NA	2.4E-02	mg/kg/day	7.0E-01	mg/kg/day	3.4E-02
				Manganese	1.3E+02	mg/kg	4.5E-06	mg/kg/day	NA		NA	3.1E-04	mg/kg/day	1.4E-01	mg/kg/day	2.2E-03
				Mercury	2.4E-01	mg/kg	7.9E-09	mg/kg/day	NA		NA	5.5E-07	mg/kg/day	1.0E-04	mg/kg/day	5.5E-03
				Vanadium	1.9E+01	mg/kg	6.3E-07	mg/kg/day	NA		NA	4.4E-05	mg/kg/day	5.0E-03	mg/kg/day	8.8E-03
			Exp. Route Total								1.3E-06					2.4E-01
			Dermal Absorption													
				Benzo(a)anthracene	7.2E-02	mg/kg	6.5E-10	mg/kg/day	7.3E-01	mg/kg/day	4.7E-10	3.3E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	8.8E-10	mg/kg/day	7.3E+00	mg/kg/day	6.4E-09	4.6E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	8.7E-10	mg/kg/day	7.3E-01	mg/kg/day	6.3E-10	4.5E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	8.3E-10	mg/kg/day	7.3E-02	mg/kg/day	6.1E-11	4.3E-07	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	8.0E-10	mg/kg/day	7.3E-03	mg/kg/day	5.8E-12	4.1E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	4.0E-10	mg/kg/day	7.3E+00	mg/kg/day	3.0E-09	2.1E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	1.3E-09	mg/kg/day	7.3E-01	mg/kg/day	9.8E-10	7.0E-07	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	4.8E-06	mg/kg/day	NA		NA	2.5E-03	mg/kg/day	1.0E+00	mg/kg/day	2.5E-03
				Antimony	7.6E-01	mg/kg	5.3E-10	mg/kg/day	NA		NA	2.7E-07	mg/kg/day	3.0E-04	mg/kg/day	9.1E-04
				Arsenic	2.1E+01	mg/kg	4.3E-08	mg/kg/day	1.5E+00	mg/kg/day	6.4E-08	2.2E-05	mg/kg/day	6.0E-05	mg/kg/day	3.7E-01
				Chromium	1.4E+01	mg/kg	9.5E-09	mg/kg/day	2.0E+01	mg/kg/day	1.9E-07	4.9E-06	mg/kg/day	5.0E-04	mg/kg/day	9.8E-03
				Cobalt	2.8E+00	mg/kg	1.9E-09	mg/kg/day	NA		NA	1.0E-06	mg/kg/day	3.0E-03	mg/kg/day	3.3E-04
				Iron	1.0E+04	mg/kg	7.0E-06	mg/kg/day	NA		NA	3.6E-03	mg/kg/day	7.0E-01	mg/kg/day	5.2E-03
				Manganese	1.3E+02	mg/kg	9.3E-08	mg/kg/day	NA		NA	4.8E-05	mg/kg/day	1.4E-01	mg/kg/day	3.4E-04
				Mercury	2.4E-01	mg/kg	1.6E-10	mg/kg/day	NA		NA	8.4E-08	mg/kg/day	1.0E-04	mg/kg/day	8.4E-04
				Vanadium	1.9E+01	mg/kg	1.3E-08	mg/kg/day	NA		NA	6.7E-06	mg/kg/day	5.0E-03	mg/kg/day	1.3E-03
			Exp. Route Total								2.6E-07					3.9E-01
		Exposure Point Total									2.6E-07					6.3E-01
	Exposure Medium Total										1.6E-06					6.3E-01

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Air	Emissions from Soil Outside Waste Area	Inhalation	Chromium	1.0E-08	mg/m^3	1.6E-11	mg/m^3	8.4E-02	(ug/m3)$^{-1}$	1.4E-09	1.1E-09	mg/m^3	1.0E-04	mg/m^3	1.1E-05
			Exp. Route Total								1.4E-09					1.1E-05
		Exposure Point Total									1.4E-09					1.1E-05
	Exposure Medium Total										1.4E-09					1.1E-05
Soil* Outside Waste Area											1.6E-06					6.3E-01
Soil*	Soil*	Soil in Sludge Area	Ingestion	Chromium	6.9E+00	mg/kg	2.3E-07	mg/kg/day	5.0E-01	mg/kg/day	1.2E-07	1.6E-05	mg/kg/day	2.0E-02	mg/kg/day	8.1E-04
				Cobalt	8.7E+00	mg/kg	2.9E-07	mg/kg/day	NA		NA	2.0E-05	mg/kg/day	3.0E-03	mg/kg/day	6.8E-03
				Iron	5.8E+03	mg/kg	2.0E-04	mg/kg/day	NA		NA	1.4E-02	mg/kg/day	7.0E-01	mg/kg/day	2.0E-02
				Manganese	2.5E+02	mg/kg	8.2E-06	mg/kg/day	NA		NA	5.8E-04	mg/kg/day	1.4E-01	mg/kg/day	4.1E-03
			Exp. Route Total								1.2E-07					3.1E-02
			Dermal Absorption	Chromium	6.9E+00	mg/kg	4.8E-09	mg/kg/day	2.0E+01	mg/kg/day	9.5E-08	3.3E-07	mg/kg/day	5.0E-04	mg/kg/day	6.7E-04
				Cobalt	8.7E+00	mg/kg	6.0E-09	mg/kg/day	NA		NA	4.2E-07	mg/kg/day	3.0E-03	mg/kg/day	1.4E-04
				Iron	5.8E+03	mg/kg	4.0E-06	mg/kg/day	NA		NA	2.8E-04	mg/kg/day	7.0E-01	mg/kg/day	4.0E-04
				Manganese	2.5E+02	mg/kg	1.7E-07	mg/kg/day	NA		NA	1.2E-05	mg/kg/day	1.4E-01	mg/kg/day	8.5E-05
			Exp. Route Total								9.5E-08					1.3E-03
		Exposure Point Total									2.1E-07					3.3E-02
	Exposure Medium Total										2.1E-07					3.3E-02
Soil* in Sludge Area											2.1E-07					3.3E-02
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Water in Excavation Pit	Dermal Absorption	Heptachlor epoxide	2.7E-02	ug/L	7.1E-09	mg/kg/day	9.1E+00	mg/kg/day	6.4E-08	4.9E-07	mg/kg/day	1.3E-05	mg/kg/day	3.8E-02
				RDX	1.8E+00	ug/L	2.8E-09	mg/kg/day	1.1E-01	mg/kg/day	3.1E-10	1.9E-07	mg/kg/day	5.0E-02	mg/kg/day	3.9E-06
			Exp. Route Total								6.4E-08					3.8E-02
		Exposure Point Total									6.4E-08					3.8E-02
	Exposure Medium Total										6.4E-08					3.8E-02
Shallow Aquifer Groundwater Total											**6.4E-08**					**3.8E-02**
										Total of Receptor Risks Across All Media	2.1E-06				Total of Receptor Hazards Across All Media	4.1E+00

bold indicates soil area with greatest risk or hazard index

Notes-

NA = Not applicable.

Total is maximum of soil (in waste area, across site, outside waste area, or sludge area) and groundwater (shallow).

DA_{event} for dermal exposure to groundwater calculated on Table 7.7.RME Supplement A

Table 7.7.RME Supplement A
Calculation of DAevent
Construction Worker - Shallow Aquifer Groundwater
Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	**Water Concentration (CW)** (µg/L)	**Permeability Coefficient (Kp)** (cm/hr)	**B** (dimensionless)	**Lag Time (τ_{event})** (hr)	**t*** (hr)	**Fraction Absorbed Water (FA)** (dimensionless)	**Duration of Event (t_{event})** (hr)	**DA_{event}** (mg/cm^2-event)	**Eq**
Heptachlor epoxide[2]	2.7E-02	2.1E-02	1.6E-01	1.6E+01	3.8E+01	1.0E+00	8	1.8E-08	2
RDX[2]	1.8E+00	3.4E-04	1.9E-03	1.8E+00	4.4E+00	1.0E+00	8	7.0E-09	3

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If t_{event} < t* then

$$DA_{event} = 2 \times FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \sqrt{\frac{6 \times \tau_{event} \times t_{event}}{\pi}} \qquad \text{(eq 2)}$$

If t_{event} > t* then

$$DA_{event} = FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \left[\frac{t_{event}}{1+B} + 2 \times \tau_{event} \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right] \qquad \text{(eq 3)}$$

Notes:
[1] Values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
[2] Lag time and B calculated on Table 7.4.RME Supplement B. Permeability constants from RAIS databases (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

TABLE 7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	7.3E-07	mg/kg/day	3.1E-01	mg/kg/day	2.3E-07	2.1E-06	mg/kg/day	2.0E-03	mg/kg/day	1.0E-03
				Benzo(a)anthracene	4.2E-02	mg/kg	1.5E-08	mg/kg/day	7.3E-01	mg/kg/day	1.1E-08	4.1E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	1.4E-08	mg/kg/day	7.3E+00	mg/kg/day	1.0E-07	3.9E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	2.0E-08	mg/kg/day	7.3E-01	mg/kg/day	1.4E-08	5.5E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	1.6E-08	mg/kg/day	7.3E-02	mg/kg/day	1.2E-09	4.5E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	1.7E-08	mg/kg/day	7.3E-03	mg/kg/day	1.3E-10	4.9E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	3.2E-08	mg/kg/day	7.0E+00	mg/kg/day	2.3E-07	9.1E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	1.1E-07	mg/kg/day	6.3E+00	mg/kg/day	6.8E-07	3.0E-07	mg/kg/day	8.0E-03	mg/kg/day	3.8E-05
				Aroclor-1254	1.2E+01	mg/kg	4.1E-06	mg/kg/day	2.0E+00	mg/kg/day	8.1E-06	1.1E-05	mg/kg/day	2.0E-05	mg/kg/day	5.7E-01
				Aroclor-1260	7.4E-01	mg/kg	2.6E-07	mg/kg/day	2.0E+00	mg/kg/day	5.2E-07	7.2E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	1.4E-08	mg/kg/day	1.6E+01	mg/kg/day	2.2E-07	3.9E-08	mg/kg/day	5.0E-05	mg/kg/day	7.8E-04
				Heptachlor	1.4E-01	mg/kg	4.9E-08	mg/kg/day	4.5E+00	mg/kg/day	2.2E-07	1.4E-07	mg/kg/day	5.0E-04	mg/kg/day	2.7E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	1.4E-06	mg/kg/day	3.0E-02	mg/kg/day	4.3E-08	4.0E-06	mg/kg/day	5.0E-04	mg/kg/day	8.0E-03
				Aluminum	9.0E+04	mg/kg	3.1E-02	mg/kg/day	NA		NA	8.8E-02	mg/kg/day	1.0E+00	mg/kg/day	8.8E-02
				Arsenic	2.9E+00	mg/kg	1.0E-06	mg/kg/day	1.5E+00	mg/kg/day	1.5E-06	2.8E-06	mg/kg/day	3.0E-04	mg/kg/day	9.5E-03
				Cadmium	5.0E+02	mg/kg	1.8E-04	mg/kg/day	NA		NA	4.9E-04	mg/kg/day	1.0E-03	mg/kg/day	4.9E-01
				Chromium	2.1E+01	mg/kg	7.4E-06	mg/kg/day	5.0E-01	mg/kg/day	3.7E-06	2.1E-05	mg/kg/day	3.0E-03	mg/kg/day	6.9E-03
				Cobalt	5.2E+00	mg/kg	1.8E-06	mg/kg/day	NA		NA	5.0E-06	mg/kg/day	3.0E-04	mg/kg/day	1.7E-02
				Copper	5.2E+03	mg/kg	1.8E-03	mg/kg/day	NA		NA	5.0E-03	mg/kg/day	4.0E-02	mg/kg/day	1.3E-01
				Iron	1.1E+04	mg/kg	3.7E-03	mg/kg/day	NA		NA	1.0E-02	mg/kg/day	7.0E-01	mg/kg/day	1.5E-02
				Manganese	7.5E+02	mg/kg	2.6E-04	mg/kg/day	NA		NA	7.3E-04	mg/kg/day	1.4E-01	mg/kg/day	5.2E-03
				Vanadium	3.4E+01	mg/kg	1.2E-05	mg/kg/day	NA		NA	3.3E-05	mg/kg/day	5.0E-03	mg/kg/day	6.6E-03
			Exp. Route Total								1.6E-05					1.3E+00
			Dermal Absorption													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	4.8E-07	mg/kg/day	3.1E-01	mg/kg/day	1.5E-07	1.4E-06	mg/kg/day	2.0E-03	mg/kg/day	6.8E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	1.3E-08	mg/kg/day	7.3E-01	mg/kg/day	9.2E-09	3.5E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	1.2E-08	mg/kg/day	7.3E+00	mg/kg/day	8.8E-08	3.4E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	1.7E-08	mg/kg/day	7.3E-01	mg/kg/day	1.2E-08	4.7E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	1.4E-08	mg/kg/day	7.3E-02	mg/kg/day	1.0E-09	3.9E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	1.5E-08	mg/kg/day	7.3E-03	mg/kg/day	1.1E-10	4.2E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	2.1E-08	mg/kg/day	7.0E+00	mg/kg/day	1.5E-07	6.0E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	7.1E-08	mg/kg/day	6.3E+00	mg/kg/day	4.5E-07	2.0E-07	mg/kg/day	8.0E-03	mg/kg/day	2.5E-05
				Aroclor-1254	1.2E+01	mg/kg	3.7E-06	mg/kg/day	2.0E+00	mg/kg/day	7.5E-06	1.0E-05	mg/kg/day	2.0E-05	mg/kg/day	5.2E-01
				Aroclor-1260	7.4E-01	mg/kg	2.4E-07	mg/kg/day	2.0E+00	mg/kg/day	4.8E-07	6.7E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	9.2E-09	mg/kg/day	1.6E+01	mg/kg/day	1.5E-07	2.6E-08	mg/kg/day	5.0E-05	mg/kg/day	5.1E-04
				Heptachlor	1.4E-01	mg/kg	3.2E-08	mg/kg/day	4.5E+00	mg/kg/day	1.5E-07	9.1E-08	mg/kg/day	5.0E-04	mg/kg/day	1.8E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	3.0E-07	mg/kg/day	3.0E-02	mg/kg/day	9.1E-09	8.5E-07	mg/kg/day	5.0E-04	mg/kg/day	1.7E-03
				Aluminum	9.0E+04	mg/kg	2.1E-03	mg/kg/day	NA		NA	5.8E-03	mg/kg/day	1.0E+00	mg/kg/day	5.8E-03
				Arsenic	2.9E+00	mg/kg	2.0E-07	mg/kg/day	1.5E+00	mg/kg/day	3.0E-07	5.6E-07	mg/kg/day	3.0E-04	mg/kg/day	1.9E-03
				Cadmium	5.0E+02	mg/kg	1.2E-06	mg/kg/day	NA		NA	3.3E-06	mg/kg/day	2.5E-05	mg/kg/day	1.3E-01
				Chromium	2.1E+01	mg/kg	4.9E-07	mg/kg/day	2.0E+01	mg/kg/day	9.8E-06	1.4E-06	mg/kg/day	7.5E-05	mg/kg/day	1.8E-02
				Cobalt	5.2E+00	mg/kg	1.2E-07	mg/kg/day	NA		NA	3.3E-07	mg/kg/day	3.0E-04	mg/kg/day	1.1E-03

TABLE 7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Copper	5.2E+03	mg/kg	1.2E-04	mg/kg/day	NA		NA	3.3E-04	mg/kg/day	4.0E-02	mg/kg/day	8.3E-03
				Iron	1.1E+04	mg/kg	2.5E-04	mg/kg/day	NA		NA	6.9E-04	mg/kg/day	7.0E-01	mg/kg/day	9.9E-04
				Manganese	7.5E+02	mg/kg	1.7E-05	mg/kg/day	NA		NA	4.8E-05	mg/kg/day	1.4E-01	mg/kg/day	3.4E-04
				Vanadium	3.4E+01	mg/kg	7.8E-07	mg/kg/day	NA		NA	2.2E-06	mg/kg/day	5.0E-03	mg/kg/day	4.3E-04
			Exp. Route Total								1.9E-05					6.9E-01
		Exposure Point Total									3.5E-05					2.0E+00
	Exposure Medium Total										3.5E-05					2.0E+00
	Air	Emissions from Soil* in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3	1.3E-09	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	1.1E-07	3.6E-09	mg/m^3	1.0E-04	mg/m^3	3.6E-05
			Exp. Route Total								1.1E-07					3.6E-05
		Exposure Point Total									1.1E-07					3.6E-05
	Exposure Medium Total										1.1E-07					3.6E-05
Soil* In Waste Area											**3.5E-05**					**2.0E+00**
Soil*	Soil*	Soil Across Site	Ingestion	2,4-Dinitrotoluene	2.1E-01	mg/kg	7.3E-08	mg/kg/day	3.1E-01	mg/kg/day	2.3E-08	2.0E-07	mg/kg/day	2.0E-03	mg/kg/day	1.0E-04
				Benzo(a)anthracene	7.0E-02	mg/kg	2.4E-08	mg/kg/day	7.3E-01	mg/kg/day	1.8E-08	6.8E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	4.0E-08	mg/kg/day	7.3E+00	mg/kg/day	2.9E-07	1.1E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	3.1E-08	mg/kg/day	7.3E-01	mg/kg/day	2.3E-08	8.8E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	3.0E-08	mg/kg/day	7.3E-02	mg/kg/day	2.2E-09	8.3E-08	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	3.0E-08	mg/kg/day	7.3E-03	mg/kg/day	2.2E-10	8.4E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-08	mg/kg/day	7.3E+00	mg/kg/day	1.1E-07	4.4E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.2E-08	mg/kg/day	7.3E-01	mg/kg/day	3.8E-08	1.5E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	3.2E-08	mg/kg/day	7.0E+00	mg/kg/day	2.3E-07	9.1E-08	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	1.4E-08	mg/kg/day	6.3E+00	mg/kg/day	8.6E-08	3.8E-08	mg/kg/day	8.0E-03	mg/kg/day	4.8E-06
				Aroclor-1254	3.2E+00	mg/kg	1.1E-06	mg/kg/day	2.0E+00	mg/kg/day	2.2E-06	3.1E-06	mg/kg/day	2.0E-05	mg/kg/day	1.6E-01
				Aroclor-1260	2.2E-01	mg/kg	7.7E-08	mg/kg/day	2.0E+00	mg/kg/day	1.5E-07	2.1E-07	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	1.2E-09	mg/kg/day	1.6E+01	mg/kg/day	1.9E-08	3.4E-09	mg/kg/day	5.0E-05	mg/kg/day	6.8E-05
				Heptachlor	1.7E-02	mg/kg	5.9E-09	mg/kg/day	4.5E+00	mg/kg/day	2.7E-08	1.7E-08	mg/kg/day	5.0E-04	mg/kg/day	3.3E-05
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	4.7E-07	mg/kg/day	3.0E-02	mg/kg/day	1.4E-08	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	2.6E-03
				Aluminum	2.6E+04	mg/kg	9.1E-03	mg/kg/day	NA		NA	2.6E-02	mg/kg/day	1.0E+00	mg/kg/day	2.6E-02
				Antimony	6.9E-01	mg/kg	2.4E-07	mg/kg/day	NA		NA	6.8E-07	mg/kg/day	4.0E-04	mg/kg/day	1.7E-03
				Arsenic	1.7E+01	mg/kg	5.8E-06	mg/kg/day	1.5E+00	mg/kg/day	8.7E-06	1.6E-05	mg/kg/day	3.0E-04	mg/kg/day	5.4E-02
				Cadmium	8.1E+01	mg/kg	2.8E-05	mg/kg/day	NA		NA	8.0E-05	mg/kg/day	1.0E-03	mg/kg/day	8.0E-02
				Chromium	1.7E+01	mg/kg	6.0E-06	mg/kg/day	5.0E-01	mg/kg/day	3.0E-06	1.7E-05	mg/kg/day	3.0E-03	mg/kg/day	5.6E-03
				Cobalt	2.9E+00	mg/kg	1.0E-06	mg/kg/day	NA		NA	2.8E-06	mg/kg/day	3.0E-04	mg/kg/day	9.3E-03
				Copper	9.0E+02	mg/kg	3.1E-04	mg/kg/day	NA		NA	8.8E-04	mg/kg/day	4.0E-02	mg/kg/day	2.2E-02
				Iron	1.2E+04	mg/kg	4.0E-03	mg/kg/day	NA		NA	1.1E-02	mg/kg/day	7.0E-01	mg/kg/day	1.6E-02
				Manganese	2.4E+02	mg/kg	8.4E-05	mg/kg/day	NA		NA	2.3E-04	mg/kg/day	1.4E-01	mg/kg/day	1.7E-03

TABLE 7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Ingestion	Mercury	2.1E-01	mg/kg	7.2E-08	mg/kg/day	NA		NA	2.0E-07	mg/kg/day	1.0E-04	mg/kg/day	2.0E-03
				Vanadium	1.9E+01	mg/kg	6.5E-06	mg/kg/day	NA		NA	1.8E-05	mg/kg/day	5.0E-03	mg/kg/day	3.6E-03
			Exp. Route Total								1.5E-05					3.8E-01
			Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	4.8E-08	mg/kg/day	3.1E-01	mg/kg/day	1.5E-08	1.3E-07	mg/kg/day	2.0E-03	mg/kg/day	6.7E-05
				Benzo(a)anthracene	7.0E-02	mg/kg	2.1E-08	mg/kg/day	7.3E-01	mg/kg/day	1.5E-08	5.9E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	3.4E-08	mg/kg/day	7.3E+00	mg/kg/day	2.5E-07	9.5E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	2.7E-08	mg/kg/day	7.3E-01	mg/kg/day	2.0E-08	7.5E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	2.6E-08	mg/kg/day	7.3E-02	mg/kg/day	1.9E-09	7.2E-08	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	2.6E-08	mg/kg/day	7.3E-03	mg/kg/day	1.9E-10	7.2E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.3E-08	mg/kg/day	7.3E+00	mg/kg/day	9.8E-08	3.8E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	4.5E-08	mg/kg/day	7.3E-01	mg/kg/day	3.3E-08	1.3E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	2.1E-08	mg/kg/day	7.0E+00	mg/kg/day	1.5E-07	6.0E-08	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	9.1E-09	mg/kg/day	6.3E+00	mg/kg/day	5.7E-08	2.5E-08	mg/kg/day	8.0E-03	mg/kg/day	3.2E-06
				Aroclor-1254	3.2E+00	mg/kg	1.0E-06	mg/kg/day	2.0E+00	mg/kg/day	2.1E-06	2.9E-06	mg/kg/day	2.0E-05	mg/kg/day	1.4E-01
				Aroclor-1260	2.2E-01	mg/kg	7.1E-08	mg/kg/day	2.0E+00	mg/kg/day	1.4E-07	2.0E-07	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	8.0E-10	mg/kg/day	1.6E+01	mg/kg/day	1.3E-08	2.2E-09	mg/kg/day	5.0E-05	mg/kg/day	4.5E-05
				Heptachlor	1.7E-02	mg/kg	3.9E-09	mg/kg/day	4.5E+00	mg/kg/day	1.8E-08	1.1E-08	mg/kg/day	5.0E-04	mg/kg/day	2.2E-05
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	9.9E-08	mg/kg/day	3.0E-02	mg/kg/day	3.0E-09	2.8E-07	mg/kg/day	5.0E-04	mg/kg/day	5.5E-04
				Aluminum	2.6E+04	mg/kg	6.0E-04	mg/kg/day	NA		NA	1.7E-03	mg/kg/day	1.0E+00	mg/kg/day	1.7E-03
				Antimony	6.9E-01	mg/kg	1.6E-08	mg/kg/day	NA		NA	4.5E-08	mg/kg/day	6.0E-05	mg/kg/day	7.5E-04
				Arsenic	1.7E+01	mg/kg	1.1E-06	mg/kg/day	1.5E+00	mg/kg/day	1.7E-06	3.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Cadmium	8.1E+01	mg/kg	1.9E-07	mg/kg/day	NA		NA	5.3E-07	mg/kg/day	2.5E-05	mg/kg/day	2.1E-02
				Chromium	1.7E+01	mg/kg	4.0E-07	mg/kg/day	2.0E+01	mg/kg/day	8.0E-06	1.1E-06	mg/kg/day	7.5E-05	mg/kg/day	1.5E-02
				Cobalt	2.9E+00	mg/kg	6.6E-08	mg/kg/day	NA		NA	1.8E-07	mg/kg/day	3.0E-04	mg/kg/day	6.2E-04
				Copper	9.0E+02	mg/kg	2.1E-05	mg/kg/day	NA		NA	5.8E-05	mg/kg/day	4.0E-02	mg/kg/day	1.5E-03
				Iron	1.2E+04	mg/kg	2.7E-04	mg/kg/day	NA		NA	7.5E-04	mg/kg/day	7.0E-01	mg/kg/day	1.1E-03
				Manganese	2.4E+02	mg/kg	5.5E-06	mg/kg/day	NA		NA	1.5E-05	mg/kg/day	1.4E-01	mg/kg/day	1.1E-04
				Mercury	2.1E-01	mg/kg	4.8E-09	mg/kg/day	NA		NA	1.3E-08	mg/kg/day	1.0E-04	mg/kg/day	1.3E-04
				Vanadium	1.9E+01	mg/kg	4.3E-07	mg/kg/day	NA		NA	1.2E-06	mg/kg/day	5.0E-03	mg/kg/day	2.4E-04
			Exp. Route Total								1.3E-05					2.0E-01
		Exposure Point Total									2.8E-05					5.8E-01
	Exposure Medium Total										2.8E-05					5.8E-01
	Air	Emissions from Soil* Across Site	Inhalation	Chromium	1.3E-08	mg/m^3	1.0E-09	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	8.7E-08	2.9E-09	mg/m^3	1.0E-04	mg/m^3	2.9E-05
			Exp. Route Total								8.7E-08					2.9E-05
		Exposure Point Total									8.7E-08					2.9E-05
	Exposure Medium Total										8.7E-08					2.9E-05
Soil* Across Site											2.8E-05					5.8E-01

TABLE 7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.2E-02	mg/kg	2.5E-08	mg/kg/day	7.3E-01	mg/kg/day	1.8E-08	7.0E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	3.4E-08	mg/kg/day	7.3E+00	mg/kg/day	2.5E-07	9.6E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	3.4E-08	mg/kg/day	7.3E-01	mg/kg/day	2.5E-08	9.4E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	3.2E-08	mg/kg/day	7.3E-02	mg/kg/day	2.4E-09	9.1E-08	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	3.1E-08	mg/kg/day	7.3E-03	mg/kg/day	2.3E-10	8.7E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-08	mg/kg/day	7.3E+00	mg/kg/day	1.1E-07	4.4E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.2E-08	mg/kg/day	7.3E-01	mg/kg/day	3.8E-08	1.5E-07	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	2.4E-03	mg/kg/day	NA		NA	6.8E-03	mg/kg/day	1.0E+00	mg/kg/day	6.8E-03
				Antimony	7.6E-01	mg/kg	2.7E-07	mg/kg/day	NA		NA	7.5E-07	mg/kg/day	4.0E-04	mg/kg/day	1.9E-03
				Arsenic	2.1E+01	mg/kg	7.2E-06	mg/kg/day	1.5E+00	mg/kg/day	1.1E-05	2.0E-05	mg/kg/day	3.0E-04	mg/kg/day	6.7E-02
				Chromium	1.4E+01	mg/kg	4.8E-06	mg/kg/day	5.0E-01	mg/kg/day	2.4E-06	1.3E-05	mg/kg/day	3.0E-03	mg/kg/day	4.5E-03
				Cobalt	2.8E+00	mg/kg	9.8E-07	mg/kg/day	NA		NA	2.7E-06	mg/kg/day	3.0E-04	mg/kg/day	9.1E-03
				Iron	1.0E+04	mg/kg	3.5E-03	mg/kg/day	NA		NA	9.9E-03	mg/kg/day	7.0E-01	mg/kg/day	1.4E-02
				Manganese	1.3E+02	mg/kg	4.7E-05	mg/kg/day	NA		NA	1.3E-04	mg/kg/day	1.4E-01	mg/kg/day	9.4E-04
				Mercury	2.4E-01	mg/kg	8.2E-08	mg/kg/day	NA		NA	2.3E-07	mg/kg/day	1.0E-04	mg/kg/day	2.3E-03
				Vanadium	1.9E+01	mg/kg	6.6E-06	mg/kg/day	NA		NA	1.8E-05	mg/kg/day	5.0E-03	mg/kg/day	3.7E-03
			Exp. Route Total								1.4E-05					1.1E-01
			Dermal Absorption													
				Benzo(a)anthracene	7.2E-02	mg/kg	2.2E-08	mg/kg/day	7.3E-01	mg/kg/day	1.6E-08	6.0E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	2.9E-08	mg/kg/day	7.3E+00	mg/kg/day	2.1E-07	8.2E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	2.9E-08	mg/kg/day	7.3E-01	mg/kg/day	2.1E-08	8.1E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	2.8E-08	mg/kg/day	7.3E-02	mg/kg/day	2.0E-09	7.8E-08	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	2.7E-08	mg/kg/day	7.3E-03	mg/kg/day	1.9E-10	7.5E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.3E-08	mg/kg/day	7.3E+00	mg/kg/day	9.8E-08	3.8E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	4.5E-08	mg/kg/day	7.3E-01	mg/kg/day	3.3E-08	1.3E-07	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	1.6E-04	mg/kg/day	NA		NA	4.5E-04	mg/kg/day	1.0E+00	mg/kg/day	4.5E-04
				Antimony	7.6E-01	mg/kg	1.8E-08	mg/kg/day	NA		NA	4.9E-08	mg/kg/day	6.0E-05	mg/kg/day	8.2E-04
				Arsenic	2.1E+01	mg/kg	1.4E-06	mg/kg/day	1.5E+00	mg/kg/day	2.1E-06	4.0E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Chromium	1.4E+01	mg/kg	3.2E-07	mg/kg/day	2.0E+01	mg/kg/day	6.3E-06	8.8E-07	mg/kg/day	7.5E-05	mg/kg/day	1.2E-02
				Cobalt	2.8E+00	mg/kg	6.5E-08	mg/kg/day	NA		NA	1.8E-07	mg/kg/day	3.0E-04	mg/kg/day	6.0E-04
				Iron	1.0E+04	mg/kg	2.3E-04	mg/kg/day	NA		NA	6.6E-04	mg/kg/day	7.0E-01	mg/kg/day	9.4E-04
				Manganese	1.3E+02	mg/kg	3.1E-06	mg/kg/day	NA		NA	8.6E-06	mg/kg/day	1.4E-01	mg/kg/day	6.2E-05
				Mercury	2.4E-01	mg/kg	5.4E-09	mg/kg/day	NA		NA	1.5E-08	mg/kg/day	1.0E-04	mg/kg/day	1.5E-04
				Vanadium	1.9E+01	mg/kg	4.3E-07	mg/kg/day	NA		NA	1.2E-06	mg/kg/day	5.0E-03	mg/kg/day	2.4E-04
			Exp. Route Total								8.8E-06					2.8E-02
		Exposure Point Total									2.2E-05					1.4E-01
	Exposure Medium Total										2.2E-05					1.4E-01
	Air	Emissions from Soil Outside Waste Area	Inhalation	Chromium	1.0E-08	mg/m^3	8.2E-10	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	6.9E-08	2.3E-09	mg/m^3	1.0E-04	mg/m^3	2.3E-05
			Exp. Route Total								6.9E-08					2.3E-05
		Exposure Point Total									6.9E-08					2.3E-05
	Exposure Medium Total										6.9E-08					2.3E-05
Soil* Outside Waste Area											2.3E-05					1.4E-01

TABLE 7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Ingestion	Heptachlor epoxide	2.7E-02	ug/L	9.5E-08	mg/kg/day	9.1E+00	mg/kg/day	8.6E-07	2.7E-07	mg/kg/day	1.3E-05	mg/kg/day	2.0E-02
				RDX	1.8E+00	ug/L	6.2E-06	mg/kg/day	1.1E-01	mg/kg/day	6.8E-07	1.7E-05	mg/kg/day	3.0E-03	mg/kg/day	5.8E-03
			Exp. Route Total								1.5E-06					2.6E-02
	Exposure Medium Total										1.5E-06					2.6E-02
Shallow Aquifer Groundwater Total											**1.5E-06**					2.6E-02
Groundwater	Groundwater	Yorktown-Eastover Deep Aquifer Tap Water	Ingestion	Heptachlor epoxide	9.8E-03	ug/L	3.4E-08	mg/kg/day	9.1E+00	mg/kg/day	3.1E-07	9.6E-08	mg/kg/day	1.3E-05	mg/kg/day	7.4E-03
				Manganese	1.1E+02	ug/L	3.9E-04	mg/kg/day	NA		NA	1.1E-03	mg/kg/day	2.4E-02	mg/kg/day	4.6E-02
			Exp. Route Total								3.1E-07					5.3E-02
		Exposure Point Total									3.1E-07					5.3E-02
	Exposure Medium Total										3.1E-07					5.3E-02
Deep Aquifer Groundwater Total											3.1E-07					**5.3E-02**
Total of Receptor Risks Across All Media											3.6E-05	Total of Receptor Hazards Across All Media				2.1E+00

bold indicates soil area and groundwater aquifer with greatest risk

Notes-

NA = Not applicable.

Total is maximum of soil (in waste area, outside waste area, across site, or sludge area) and groundwater (shallow or deep).

Soil* indicates combined surface and subsurface soil.

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	1.5E-07	mg/kg/day	3.1E-01	mg/kg/day	4.5E-08	4.3E-07	mg/kg/day	2.0E-03	mg/kg/day	2.1E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	2.9E-09	mg/kg/day	7.3E-01	mg/kg/day	2.1E-09	8.5E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	2.8E-09	mg/kg/day	7.3E+00	mg/kg/day	2.0E-08	8.1E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	3.9E-09	mg/kg/day	7.3E-01	mg/kg/day	2.9E-09	1.1E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	3.2E-09	mg/kg/day	7.3E-02	mg/kg/day	2.3E-10	9.4E-09	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	3.5E-09	mg/kg/day	7.3E-03	mg/kg/day	2.5E-11	1.0E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	6.5E-09	mg/kg/day	7.0E+00	mg/kg/day	4.5E-08	1.9E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	2.2E-08	mg/kg/day	6.3E+00	mg/kg/day	1.4E-07	6.3E-08	mg/kg/day	8.0E-03	mg/kg/day	7.8E-06
				Aroclor-1254	1.2E+01	mg/kg	8.1E-07	mg/kg/day	2.0E+00	mg/kg/day	1.6E-06	2.4E-06	mg/kg/day	2.0E-05	mg/kg/day	1.2E-01
				Aroclor-1260	7.4E-01	mg/kg	5.2E-08	mg/kg/day	2.0E+00	mg/kg/day	1.0E-07	1.5E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	2.8E-09	mg/kg/day	1.6E+01	mg/kg/day	4.4E-08	8.1E-09	mg/kg/day	5.0E-05	mg/kg/day	1.6E-04
				Heptachlor	1.4E-01	mg/kg	9.8E-09	mg/kg/day	4.5E+00	mg/kg/day	4.4E-08	2.9E-08	mg/kg/day	5.0E-04	mg/kg/day	5.7E-05
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	2.9E-07	mg/kg/day	3.0E-02	mg/kg/day	8.6E-09	8.3E-07	mg/kg/day	5.0E-04	mg/kg/day	1.7E-03
				Aluminum	9.0E+04	mg/kg	6.3E-03	mg/kg/day	NA		NA	1.8E-02	mg/kg/day	1.0E+00	mg/kg/day	1.8E-02
				Arsenic	2.9E+00	mg/kg	2.0E-07	mg/kg/day	1.5E+00	mg/kg/day	3.0E-07	5.9E-07	mg/kg/day	3.0E-04	mg/kg/day	2.0E-03
				Cadmium	5.0E+02	mg/kg	3.5E-05	mg/kg/day	NA		NA	1.0E-04	mg/kg/day	1.0E-03	mg/kg/day	1.0E-01
				Chromium	2.1E+01	mg/kg	1.5E-06	mg/kg/day	5.0E-01	mg/kg/day	7.4E-07	4.3E-06	mg/kg/day	3.0E-03	mg/kg/day	1.4E-03
				Cobalt	5.2E+00	mg/kg	3.6E-07	mg/kg/day	NA		NA	1.1E-06	mg/kg/day	3.0E-04	mg/kg/day	3.5E-03
				Copper	5.2E+03	mg/kg	3.6E-04	mg/kg/day	NA		NA	1.0E-03	mg/kg/day	4.0E-02	mg/kg/day	2.6E-02
				Iron	1.1E+04	mg/kg	7.5E-04	mg/kg/day	NA		NA	2.2E-03	mg/kg/day	7.0E-01	mg/kg/day	3.1E-03
				Manganese	7.5E+02	mg/kg	5.2E-05	mg/kg/day	NA		NA	1.5E-04	mg/kg/day	1.4E-01	mg/kg/day	1.1E-03
				Vanadium	3.4E+01	mg/kg	2.3E-06	mg/kg/day	NA		NA	6.8E-06	mg/kg/day	5.0E-03	mg/kg/day	1.4E-03
			Exp. Route Total								3.1E-06					2.8E-01
			Dermal Absorption													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	5.8E-08	mg/kg/day	3.1E-01	mg/kg/day	1.8E-08	1.7E-07	mg/kg/day	2.0E-03	mg/kg/day	8.5E-05
				Benzo(a)anthracene	4.2E-02	mg/kg	1.5E-09	mg/kg/day	7.3E-01	mg/kg/day	1.1E-09	4.4E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	1.4E-09	mg/kg/day	7.3E+00	mg/kg/day	1.1E-08	4.2E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	2.0E-09	mg/kg/day	7.3E-01	mg/kg/day	1.5E-09	5.9E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	1.7E-09	mg/kg/day	7.3E-02	mg/kg/day	1.2E-10	4.9E-09	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	1.8E-09	mg/kg/day	7.3E-03	mg/kg/day	1.3E-11	5.3E-09	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	2.6E-09	mg/kg/day	7.0E+00	mg/kg/day	1.8E-08	7.6E-09	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	8.6E-09	mg/kg/day	6.3E+00	mg/kg/day	5.4E-08	2.5E-08	mg/kg/day	8.0E-03	mg/kg/day	3.1E-06
				Aroclor-1254	1.2E+01	mg/kg	4.5E-07	mg/kg/day	2.0E+00	mg/kg/day	9.0E-07	1.3E-06	mg/kg/day	2.0E-05	mg/kg/day	6.6E-02
				Aroclor-1260	7.4E-01	mg/kg	2.9E-08	mg/kg/day	2.0E+00	mg/kg/day	5.8E-08	8.4E-08	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	1.1E-09	mg/kg/day	1.6E+01	mg/kg/day	1.8E-08	3.2E-09	mg/kg/day	5.0E-05	mg/kg/day	6.5E-05
				Heptachlor	1.4E-01	mg/kg	3.9E-09	mg/kg/day	4.5E+00	mg/kg/day	1.8E-08	1.1E-08	mg/kg/day	5.0E-04	mg/kg/day	2.3E-05
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	3.7E-08	mg/kg/day	3.0E-02	mg/kg/day	1.1E-09	1.1E-07	mg/kg/day	5.0E-04	mg/kg/day	2.1E-04
				Aluminum	9.0E+04	mg/kg	2.5E-04	mg/kg/day	NA		NA	7.3E-04	mg/kg/day	1.0E+00	mg/kg/day	7.3E-04
				Arsenic	2.9E+00	mg/kg	2.4E-08	mg/kg/day	1.5E+00	mg/kg/day	3.6E-08	7.1E-08	mg/kg/day	3.0E-04	mg/kg/day	2.4E-04
				Cadmium	5.0E+02	mg/kg	1.4E-07	mg/kg/day	NA		NA	4.1E-07	mg/kg/day	2.5E-05	mg/kg/day	1.6E-02
				Chromium	2.1E+01	mg/kg	5.9E-08	mg/kg/day	2.0E+01	mg/kg/day	1.2E-06	1.7E-07	mg/kg/day	7.5E-05	mg/kg/day	2.3E-03
				Cobalt	5.2E+00	mg/kg	1.4E-08	mg/kg/day	NA		NA	4.2E-08	mg/kg/day	3.0E-04	mg/kg/day	1.4E-04

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Copper	5.2E+03	mg/kg	1.4E-05	mg/kg/day	NA		NA	4.2E-05	mg/kg/day	4.0E-02	mg/kg/day	1.0E-03
				Iron	1.1E+04	mg/kg	3.0E-05	mg/kg/day	NA		NA	8.7E-05	mg/kg/day	7.0E-01	mg/kg/day	1.2E-04
				Manganese	7.5E+02	mg/kg	2.1E-06	mg/kg/day	NA		NA	6.1E-06	mg/kg/day	1.4E-01	mg/kg/day	4.3E-05
				Vanadium	3.4E+01	mg/kg	9.4E-08	mg/kg/day	NA		NA	2.7E-07	mg/kg/day	5.0E-03	mg/kg/day	5.5E-05
			Exp. Route Total								2.3E-06					8.7E-02
		Exposure Point Total									5.4E-06					3.7E-01
	Exposure Medium Total										5.4E-06					3.7E-01
	Air	Emissions from Soil* in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3	1.3E-10	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	1.1E-08	3.7E-10	mg/m^3	1.0E-04	mg/m^3	3.7E-06
			Exp. Route Total								1.1E-08					3.7E-06
		Exposure Point Total									1.1E-08					3.7E-06
	Exposure Medium Total										1.1E-08					3.7E-06
Soil* In Waste Area											**5.4E-06**					**3.7E-01**
Soil*	Soil*	Soil Across Site	Ingestion	2,4-Dinitrotoluene	2.1E-01	mg/kg	1.5E-08	mg/kg/day	3.1E-01	mg/kg/day	4.5E-09	4.2E-08	mg/kg/day	2.0E-03	mg/kg/day	2.1E-05
				Benzo(a)anthracene	7.0E-02	mg/kg	4.9E-09	mg/kg/day	7.3E-01	mg/kg/day	3.6E-09	1.4E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	7.9E-09	mg/kg/day	7.3E+00	mg/kg/day	5.8E-08	2.3E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	6.3E-09	mg/kg/day	7.3E-01	mg/kg/day	4.6E-09	1.8E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	5.9E-09	mg/kg/day	7.3E-02	mg/kg/day	4.3E-10	1.7E-08	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	6.0E-09	mg/kg/day	7.3E-03	mg/kg/day	4.4E-11	1.7E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	3.1E-09	mg/kg/day	7.3E+00	mg/kg/day	2.3E-08	9.2E-09	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	1.0E-08	mg/kg/day	7.3E-01	mg/kg/day	7.6E-09	3.1E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	6.5E-09	mg/kg/day	7.0E+00	mg/kg/day	4.5E-08	1.9E-08	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	2.7E-09	mg/kg/day	6.3E+00	mg/kg/day	1.7E-08	8.0E-09	mg/kg/day	8.0E-03	mg/kg/day	1.0E-06
				Aroclor-1254	3.2E+00	mg/kg	2.2E-07	mg/kg/day	2.0E+00	mg/kg/day	4.4E-07	6.5E-07	mg/kg/day	2.0E-05	mg/kg/day	3.2E-02
				Aroclor-1260	2.2E-01	mg/kg	1.5E-08	mg/kg/day	2.0E+00	mg/kg/day	3.1E-08	4.5E-08	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	2.4E-10	mg/kg/day	1.6E+01	mg/kg/day	3.9E-09	7.1E-10	mg/kg/day	5.0E-05	mg/kg/day	1.4E-05
				Heptachlor	1.7E-02	mg/kg	1.2E-09	mg/kg/day	4.5E+00	mg/kg/day	5.3E-09	3.4E-09	mg/kg/day	5.0E-04	mg/kg/day	6.9E-06
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	9.4E-08	mg/kg/day	3.0E-02	mg/kg/day	2.8E-09	2.7E-07	mg/kg/day	5.0E-04	mg/kg/day	5.5E-04
				Aluminum	2.6E+04	mg/kg	1.8E-03	mg/kg/day	NA		NA	5.3E-03	mg/kg/day	1.0E+00	mg/kg/day	5.3E-03
				Antimony	6.9E-01	mg/kg	4.8E-08	mg/kg/day	NA		NA	1.4E-07	mg/kg/day	4.0E-04	mg/kg/day	3.5E-04
				Arsenic	1.7E+01	mg/kg	1.2E-06	mg/kg/day	1.5E+00	mg/kg/day	1.7E-06	3.4E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Cadmium	8.1E+01	mg/kg	5.7E-06	mg/kg/day	NA		NA	1.7E-05	mg/kg/day	3.0E-04	mg/kg/day	5.5E-02
				Chromium	1.7E+01	mg/kg	1.2E-06	mg/kg/day	5.0E-01	mg/kg/day	6.0E-07	3.5E-06	mg/kg/day	3.0E-03	mg/kg/day	1.2E-03
				Cobalt	2.9E+00	mg/kg	2.0E-07	mg/kg/day	NA		NA	5.8E-07	mg/kg/day	3.0E-04	mg/kg/day	1.9E-03
				Copper	9.0E+02	mg/kg	6.3E-05	mg/kg/day	NA		NA	1.8E-04	mg/kg/day	4.0E-02	mg/kg/day	4.6E-03
				Iron	1.2E+04	mg/kg	8.1E-04	mg/kg/day	NA		NA	2.4E-03	mg/kg/day	7.0E-01	mg/kg/day	3.4E-03
				Manganese	2.4E+02	mg/kg	1.7E-05	mg/kg/day	NA		NA	4.9E-05	mg/kg/day	1.4E-01	mg/kg/day	3.5E-04

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Ingestion	Mercury	2.1E-01	mg/kg	1.4E-08	mg/kg/day	NA		NA	4.2E-08	mg/kg/day	1.0E-04	mg/kg/day	4.2E-04
				Vanadium	1.9E+01	mg/kg	1.3E-06	mg/kg/day	NA		NA	3.8E-06	mg/kg/day	5.0E-03	mg/kg/day	7.5E-04
			Exp. Route Total								3.0E-06					1.2E-01
			Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	5.8E-09	mg/kg/day	3.1E-01	mg/kg/day	1.8E-09	1.7E-08	mg/kg/day	2.0E-03	mg/kg/day	8.4E-06
				Benzo(a)anthracene	7.0E-02	mg/kg	2.5E-09	mg/kg/day	7.3E-01	mg/kg/day	1.8E-09	7.4E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	4.1E-09	mg/kg/day	7.3E+00	mg/kg/day	3.0E-08	1.2E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	3.2E-09	mg/kg/day	7.3E-01	mg/kg/day	2.4E-09	9.5E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	3.1E-09	mg/kg/day	7.3E-02	mg/kg/day	2.3E-10	9.0E-09	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	3.1E-09	mg/kg/day	7.3E-03	mg/kg/day	2.3E-11	9.1E-09	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-09	mg/kg/day	7.3E+00	mg/kg/day	1.2E-08	4.8E-09	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.4E-09	mg/kg/day	7.3E-01	mg/kg/day	4.0E-09	1.6E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	2.6E-09	mg/kg/day	7.0E+00	mg/kg/day	1.8E-08	7.6E-09	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	1.1E-09	mg/kg/day	6.3E+00	mg/kg/day	6.9E-09	3.2E-09	mg/kg/day	8.0E-03	mg/kg/day	4.0E-07
				Aroclor-1254	3.2E+00	mg/kg	1.2E-07	mg/kg/day	2.0E+00	mg/kg/day	2.5E-07	3.6E-07	mg/kg/day	2.0E-05	mg/kg/day	1.8E-02
				Aroclor-1260	2.2E-01	mg/kg	8.6E-09	mg/kg/day	2.0E+00	mg/kg/day	1.7E-08	2.5E-08	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	9.7E-11	mg/kg/day	1.6E+01	mg/kg/day	1.5E-09	2.8E-10	mg/kg/day	5.0E-05	mg/kg/day	5.6E-06
				Heptachlor	1.7E-02	mg/kg	4.7E-10	mg/kg/day	4.5E+00	mg/kg/day	2.1E-09	1.4E-09	mg/kg/day	5.0E-04	mg/kg/day	2.8E-06
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	1.2E-08	mg/kg/day	3.0E-02	mg/kg/day	3.6E-10	3.5E-08	mg/kg/day	5.0E-04	mg/kg/day	7.0E-05
				Aluminum	2.6E+04	mg/kg	7.3E-05	mg/kg/day	NA		NA	2.1E-04	mg/kg/day	1.0E+00	mg/kg/day	2.1E-04
				Antimony	6.9E-01	mg/kg	1.9E-09	mg/kg/day	NA		NA	5.6E-09	mg/kg/day	6.0E-05	mg/kg/day	9.4E-05
				Arsenic	1.7E+01	mg/kg	1.4E-07	mg/kg/day	1.5E+00	mg/kg/day	2.1E-07	4.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.3E-03
				Cadmium	8.1E+01	mg/kg	2.3E-08	mg/kg/day	NA		NA	6.6E-08	mg/kg/day	2.5E-05	mg/kg/day	2.6E-03
				Chromium	1.7E+01	mg/kg	4.8E-08	mg/kg/day	2.0E+01	mg/kg/day	9.6E-07	1.4E-07	mg/kg/day	7.5E-05	mg/kg/day	1.9E-03
				Cobalt	2.9E+00	mg/kg	8.0E-09	mg/kg/day	NA		NA	2.3E-08	mg/kg/day	3.0E-04	mg/kg/day	7.7E-05
				Copper	9.0E+02	mg/kg	2.5E-06	mg/kg/day	NA		NA	7.3E-06	mg/kg/day	4.0E-02	mg/kg/day	1.8E-04
				Iron	1.2E+04	mg/kg	3.2E-05	mg/kg/day	NA		NA	9.4E-05	mg/kg/day	7.0E-01	mg/kg/day	1.3E-04
				Manganese	2.4E+02	mg/kg	6.7E-07	mg/kg/day	NA		NA	1.9E-06	mg/kg/day	1.4E-01	mg/kg/day	1.4E-05
				Mercury	2.1E-01	mg/kg	5.7E-10	mg/kg/day	NA		NA	1.7E-09	mg/kg/day	1.0E-04	mg/kg/day	1.7E-05
				Vanadium	1.9E+01	mg/kg	5.2E-08	mg/kg/day	NA		NA	1.5E-07	mg/kg/day	5.0E-03	mg/kg/day	3.0E-05
			Exp. Route Total								1.5E-06					2.5E-02
		Exposure Point Total									4.5E-06					1.4E-01
	Exposure Medium Total										4.5E-06					1.4E-01

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Air	Emissions from Soil Across Site	Inhalation	Chromium	1.3E-08	mg/m^3	1.0E-10	mg/m^3	8.4E-02	(ug/m3)$^{-1}$	8.7E-09	3.0E-10	mg/m^3	1.0E-04	mg/m^3	3.0E-06
			Exp. Route Total								8.7E-09					3.0E-06
		Exposure Point Total									8.7E-09					3.0E-06
	Exposure Medium Total										8.7E-09					3.0E-06
Soil* Across Site											4.5E-06					1.4E-01
Soil*	Soil*	Soil Outside Waste Area	Ingestion	Benzo(a)anthracene	7.2E-02	mg/kg	5.0E-09	mg/kg/day	7.3E-01	mg/kg/day	3.7E-09	1.5E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	6.8E-09	mg/kg/day	7.3E+00	mg/kg/day	5.0E-08	2.0E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	6.7E-09	mg/kg/day	7.3E-01	mg/kg/day	4.9E-09	2.0E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	6.5E-09	mg/kg/day	7.3E-02	mg/kg/day	4.7E-10	1.9E-08	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	6.2E-09	mg/kg/day	7.3E-03	mg/kg/day	4.5E-11	1.8E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	3.1E-09	mg/kg/day	7.3E+00	mg/kg/day	2.3E-08	9.2E-09	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	1.0E-08	mg/kg/day	7.3E-01	mg/kg/day	7.6E-09	3.1E-08	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	4.9E-04	mg/kg/day	NA		NA	1.4E-03	mg/kg/day	1.0E+00	mg/kg/day	1.4E-03
				Antimony	7.6E-01	mg/kg	5.3E-08	mg/kg/day	NA		NA	1.6E-07	mg/kg/day	4.0E-04	mg/kg/day	3.9E-04
				Arsenic	2.1E+01	mg/kg	1.4E-06	mg/kg/day	1.5E+00	mg/kg/day	2.2E-06	4.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.4E-02
				Chromium	1.4E+01	mg/kg	9.5E-07	mg/kg/day	5.0E-01	mg/kg/day	4.8E-07	2.8E-06	mg/kg/day	3.0E-03	mg/kg/day	9.3E-04
				Cobalt	2.8E+00	mg/kg	2.0E-07	mg/kg/day	NA		NA	5.7E-07	mg/kg/day	3.0E-04	mg/kg/day	1.9E-03
				Iron	1.0E+04	mg/kg	7.1E-04	mg/kg/day	NA		NA	2.1E-03	mg/kg/day	7.0E-01	mg/kg/day	3.0E-03
				Manganese	1.3E+02	mg/kg	9.3E-06	mg/kg/day	NA		NA	2.7E-05	mg/kg/day	1.4E-01	mg/kg/day	1.9E-04
				Mercury	2.4E-01	mg/kg	1.6E-08	mg/kg/day	NA		NA	4.8E-08	mg/kg/day	1.0E-04	mg/kg/day	4.8E-04
				Vanadium	1.9E+01	mg/kg	1.3E-06	mg/kg/day	NA		NA	3.8E-06	mg/kg/day	5.0E-03	mg/kg/day	7.7E-04
			Exp. Route Total								2.7E-06					2.3E-02
			Dermal Absorption	Benzo(a)anthracene	7.2E-02	mg/kg	2.6E-09	mg/kg/day	7.3E-01	mg/kg/day	1.9E-09	7.6E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	3.5E-09	mg/kg/day	7.3E+00	mg/kg/day	2.6E-08	1.0E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	3.5E-09	mg/kg/day	7.3E-01	mg/kg/day	2.5E-09	1.0E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	3.4E-09	mg/kg/day	7.3E-02	mg/kg/day	2.4E-10	9.8E-09	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	3.2E-09	mg/kg/day	7.3E-03	mg/kg/day	2.4E-11	9.4E-09	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-09	mg/kg/day	7.3E+00	mg/kg/day	1.2E-08	4.8E-09	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.4E-09	mg/kg/day	7.3E-01	mg/kg/day	4.0E-09	1.6E-08	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	1.9E-05	mg/kg/day	NA		NA	5.7E-05	mg/kg/day	1.0E+00	mg/kg/day	5.7E-05
				Antimony	7.6E-01	mg/kg	2.1E-09	mg/kg/day	NA		NA	6.2E-09	mg/kg/day	6.0E-05	mg/kg/day	1.0E-04
				Arsenic	2.1E+01	mg/kg	1.7E-07	mg/kg/day	1.5E+00	mg/kg/day	2.6E-07	5.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
				Chromium	1.4E+01	mg/kg	3.8E-08	mg/kg/day	2.0E+01	mg/kg/day	7.6E-07	1.1E-07	mg/kg/day	7.5E-05	mg/kg/day	1.5E-03
				Cobalt	2.8E+00	mg/kg	7.8E-09	mg/kg/day	NA		NA	2.3E-08	mg/kg/day	3.0E-04	mg/kg/day	7.6E-05
				Iron	1.0E+04	mg/kg	2.8E-05	mg/kg/day	NA		NA	8.2E-05	mg/kg/day	7.0E-01	mg/kg/day	1.2E-04
				Manganese	1.3E+02	mg/kg	3.7E-07	mg/kg/day	NA		NA	1.1E-06	mg/kg/day	1.4E-01	mg/kg/day	7.8E-06
				Mercury	2.4E-01	mg/kg	6.5E-10	mg/kg/day	NA		NA	1.9E-09	mg/kg/day	1.0E-04	mg/kg/day	1.9E-05
				Vanadium	1.9E+01	mg/kg	5.2E-08	mg/kg/day	NA		NA	1.5E-07	mg/kg/day	5.0E-03	mg/kg/day	3.1E-05
			Exp. Route Total								1.1E-06					3.6E-03
		Exposure Point Total									1.1E-06					2.7E-02
	Exposure Medium Total										3.8E-06					2.7E-02

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Air	Emissions from Soil Outside Waste Area	Inhalation	Chromium	1.0E-08	mg/m^3	8.2E-11	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	6.9E-09	2.4E-10	mg/m^3	1.0E-04	mg/m^3	2.4E-06
			Exp. Route Total								6.9E-09					2.4E-06
		Exposure Point Total									6.9E-09					2.4E-06
	Exposure Medium Total										6.9E-09					2.4E-06
Soil* Outside Waste Area											3.8E-06					2.7E-02
							Total of Receptor Risks Across All Media				5.4E-06	Total of Receptor Hazards Across All Media				3.7E-01

bold indicates soil area with greatest risk

Notes-

NA = Not applicable.

Total is maximum of soil (in waste area, outside waste area, across site, or sludge area).

Soil* indicates combined surface and subsurface soil.

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	7.5E-08	mg/kg/day	3.1E-01	mg/kg/day	2.3E-08	5.9E-07	mg/kg/day	2.0E-03	mg/kg/day	2.9E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	1.5E-09	mg/kg/day	7.3E-01	mg/kg/day	1.1E-09	1.2E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	1.4E-09	mg/kg/day	7.3E+00	mg/kg/day	1.0E-08	1.1E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	2.0E-09	mg/kg/day	7.3E-01	mg/kg/day	1.5E-09	1.6E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	1.7E-09	mg/kg/day	7.3E-02	mg/kg/day	1.2E-10	1.3E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	1.8E-09	mg/kg/day	7.3E-03	mg/kg/day	1.3E-11	1.4E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	3.3E-09	mg/kg/day	7.0E+00	mg/kg/day	2.3E-08	2.6E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	1.1E-08	mg/kg/day	6.3E+00	mg/kg/day	7.0E-08	8.6E-08	mg/kg/day	8.0E-03	mg/kg/day	1.1E-05
				Aroclor-1254	1.2E+01	mg/kg	4.2E-07	mg/kg/day	2.0E+00	mg/kg/day	8.3E-07	3.2E-06	mg/kg/day	2.0E-05	mg/kg/day	1.6E-01
				Aroclor-1260	7.4E-01	mg/kg	2.7E-08	mg/kg/day	2.0E+00	mg/kg/day	5.3E-08	2.1E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	1.4E-09	mg/kg/day	1.6E+01	mg/kg/day	2.3E-08	1.1E-08	mg/kg/day	5.0E-05	mg/kg/day	2.2E-04
				Heptachlor	1.4E-01	mg/kg	5.0E-09	mg/kg/day	4.5E+00	mg/kg/day	2.3E-08	3.9E-08	mg/kg/day	5.0E-04	mg/kg/day	7.8E-05
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	1.5E-07	mg/kg/day	3.0E-02	mg/kg/day	4.4E-09	1.1E-06	mg/kg/day	5.0E-04	mg/kg/day	2.3E-03
				Aluminum	9.0E+04	mg/kg	3.2E-03	mg/kg/day	NA		NA	2.5E-02	mg/kg/day	1.0E+00	mg/kg/day	2.5E-02
				Arsenic	2.9E+00	mg/kg	1.0E-07	mg/kg/day	1.5E+00	mg/kg/day	1.6E-07	8.1E-07	mg/kg/day	3.0E-04	mg/kg/day	2.7E-03
				Cadmium	5.0E+02	mg/kg	1.8E-05	mg/kg/day	NA		NA	1.4E-04	mg/kg/day	1.0E-03	mg/kg/day	1.4E-01
				Chromium	2.1E+01	mg/kg	7.6E-07	mg/kg/day	5.0E-01	mg/kg/day	3.8E-07	5.9E-06	mg/kg/day	3.0E-03	mg/kg/day	2.0E-03
				Cobalt	5.2E+00	mg/kg	1.9E-07	mg/kg/day	NA		NA	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.8E-03
				Copper	5.2E+03	mg/kg	1.9E-04	mg/kg/day	NA		NA	1.4E-03	mg/kg/day	4.0E-02	mg/kg/day	3.6E-02
				Iron	1.1E+04	mg/kg	3.8E-04	mg/kg/day	NA		NA	3.0E-03	mg/kg/day	7.0E-01	mg/kg/day	4.3E-03
				Manganese	7.5E+02	mg/kg	2.7E-05	mg/kg/day	NA		NA	2.1E-04	mg/kg/day	1.4E-01	mg/kg/day	1.5E-03
				Vanadium	3.4E+01	mg/kg	1.2E-06	mg/kg/day	NA		NA	9.4E-06	mg/kg/day	5.0E-03	mg/kg/day	1.9E-03
			Exp. Route Total								1.6E-06					3.8E-01
			Dermal Absorption	2,4-Dinitrotoluene	2.1E+00	mg/kg	8.6E-08	mg/kg/day	3.1E-01	mg/kg/day	2.7E-08	6.7E-07	mg/kg/day	2.0E-03	mg/kg/day	3.3E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	2.2E-09	mg/kg/day	7.3E-01	mg/kg/day	1.6E-09	1.7E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	2.1E-09	mg/kg/day	7.3E+00	mg/kg/day	1.6E-08	1.7E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	3.0E-09	mg/kg/day	7.3E-01	mg/kg/day	2.2E-09	2.3E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	2.4E-09	mg/kg/day	7.3E-02	mg/kg/day	1.8E-10	1.9E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	2.7E-09	mg/kg/day	7.3E-03	mg/kg/day	1.9E-11	2.1E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	3.8E-09	mg/kg/day	7.0E+00	mg/kg/day	2.7E-08	3.0E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	1.3E-08	mg/kg/day	6.3E+00	mg/kg/day	8.0E-08	9.8E-08	mg/kg/day	8.0E-03	mg/kg/day	1.2E-05
				Aroclor-1254	1.2E+01	mg/kg	6.6E-07	mg/kg/day	2.0E+00	mg/kg/day	1.3E-06	5.2E-06	mg/kg/day	2.0E-05	mg/kg/day	2.6E-01
				Aroclor-1260	7.4E-01	mg/kg	4.2E-08	mg/kg/day	2.0E+00	mg/kg/day	8.5E-08	3.3E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	1.6E-09	mg/kg/day	1.6E+01	mg/kg/day	2.6E-08	1.3E-08	mg/kg/day	5.0E-05	mg/kg/day	2.5E-04
				Heptachlor	1.4E-01	mg/kg	5.7E-09	mg/kg/day	4.5E+00	mg/kg/day	2.6E-08	4.5E-08	mg/kg/day	5.0E-04	mg/kg/day	8.9E-05
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	5.4E-08	mg/kg/day	3.0E-02	mg/kg/day	1.6E-09	4.2E-07	mg/kg/day	5.0E-04	mg/kg/day	8.4E-04
				Aluminum	9.0E+04	mg/kg	3.7E-04	mg/kg/day	NA		NA	2.9E-03	mg/kg/day	1.0E+00	mg/kg/day	2.9E-03
				Arsenic	2.9E+00	mg/kg	3.6E-08	mg/kg/day	1.5E+00	mg/kg/day	5.3E-08	2.8E-07	mg/kg/day	3.0E-04	mg/kg/day	9.2E-04
				Cadmium	5.0E+02	mg/kg	2.1E-07	mg/kg/day	NA		NA	1.6E-06	mg/kg/day	2.5E-05	mg/kg/day	6.4E-02
				Chromium	2.1E+01	mg/kg	8.7E-08	mg/kg/day	2.0E+01	mg/kg/day	1.7E-06	6.8E-07	mg/kg/day	7.5E-05	mg/kg/day	9.0E-03
				Cobalt	5.2E+00	mg/kg	2.1E-08	mg/kg/day	NA		NA	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.5E-04

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Copper	5.2E+03	mg/kg	2.1E-05	mg/kg/day	NA		NA	1.6E-04	mg/kg/day	4.0E-02	mg/kg/day	4.1E-03
				Iron	1.1E+04	mg/kg	4.4E-05	mg/kg/day	NA		NA	3.4E-04	mg/kg/day	7.0E-01	mg/kg/day	4.9E-04
				Manganese	7.5E+02	mg/kg	3.1E-06	mg/kg/day	NA		NA	2.4E-05	mg/kg/day	1.4E-01	mg/kg/day	1.7E-04
				Vanadium	3.4E+01	mg/kg	1.4E-07	mg/kg/day	NA		NA	1.1E-06	mg/kg/day	5.0E-03	mg/kg/day	2.1E-04
			Exp. Route Total								3.4E-06					3.4E-01
		Exposure Point Total									5.0E-06					7.3E-01
	Exposure Medium Total										5.0E-06					7.3E-01
	Air	Emissions from Soil in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3	4.8E-11	mg/m^3	8.4E-02	(ug/m3)$^{-1}$	4.0E-09	3.7E-10	mg/m^3	1.0E-04	mg/m^3	3.7E-06
			Exp. Route Total								4.0E-09					3.7E-06
		Exposure Point Total									4.0E-09					3.7E-06
	Exposure Medium Total										4.0E-09					3.7E-06
Soil* In Waste Area											**5.0E-06**					**7.3E-01**
Soil*	Soil*	Soil Across Site	Ingestion	2,4-Dinitrotoluene	2.1E-01	mg/kg	7.5E-09	mg/kg/day	3.1E-01	mg/kg/day	2.3E-09	5.8E-08	mg/kg/day	2.0E-03	mg/kg/day	2.9E-05
				Benzo(a)anthracene	7.0E-02	mg/kg	2.5E-09	mg/kg/day	7.3E-01	mg/kg/day	1.8E-09	2.0E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	4.1E-09	mg/kg/day	7.3E+00	mg/kg/day	3.0E-08	3.2E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	3.2E-09	mg/kg/day	7.3E-01	mg/kg/day	2.4E-09	2.5E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	3.1E-09	mg/kg/day	7.3E-02	mg/kg/day	2.2E-10	2.4E-08	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	3.1E-09	mg/kg/day	7.3E-03	mg/kg/day	2.2E-11	2.4E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-09	mg/kg/day	7.3E+00	mg/kg/day	1.2E-08	1.3E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.4E-09	mg/kg/day	7.3E-01	mg/kg/day	3.9E-09	4.2E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	3.3E-09	mg/kg/day	7.0E+00	mg/kg/day	2.3E-08	2.6E-08	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	1.4E-09	mg/kg/day	6.3E+00	mg/kg/day	8.9E-09	1.1E-08	mg/kg/day	8.0E-03	mg/kg/day	1.4E-06
				Aroclor-1254	3.2E+00	mg/kg	1.1E-07	mg/kg/day	2.0E+00	mg/kg/day	2.3E-07	8.9E-07	mg/kg/day	2.0E-05	mg/kg/day	4.4E-02
				Aroclor-1260	2.2E-01	mg/kg	7.9E-09	mg/kg/day	2.0E+00	mg/kg/day	1.6E-08	6.1E-08	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	1.2E-10	mg/kg/day	1.6E+01	mg/kg/day	2.0E-09	9.7E-10	mg/kg/day	5.0E-05	mg/kg/day	1.9E-05
				Heptachlor	1.7E-02	mg/kg	6.1E-10	mg/kg/day	4.5E+00	mg/kg/day	2.7E-09	4.7E-09	mg/kg/day	5.0E-04	mg/kg/day	9.5E-06
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	4.8E-08	mg/kg/day	3.0E-02	mg/kg/day	1.4E-09	3.7E-07	mg/kg/day	5.0E-04	mg/kg/day	7.5E-04
				Aluminum	2.6E+04	mg/kg	9.4E-04	mg/kg/day	NA		NA	7.3E-03	mg/kg/day	1.0E+00	mg/kg/day	7.3E-03
				Antimony	6.9E-01	mg/kg	2.5E-08	mg/kg/day	NA		NA	1.9E-07	mg/kg/day	4.0E-04	mg/kg/day	4.8E-04
				Arsenic	1.7E+01	mg/kg	5.9E-07	mg/kg/day	1.5E+00	mg/kg/day	8.9E-07	4.6E-06	mg/kg/day	3.0E-04	mg/kg/day	1.5E-02
				Cadmium	8.1E+01	mg/kg	2.9E-06	mg/kg/day	NA		NA	2.3E-05	mg/kg/day	3.0E-04	mg/kg/day	7.6E-02
				Chromium	1.7E+01	mg/kg	6.2E-07	mg/kg/day	5.0E-01	mg/kg/day	3.1E-07	4.8E-06	mg/kg/day	3.0E-03	mg/kg/day	1.6E-03
				Cobalt	2.9E+00	mg/kg	1.0E-07	mg/kg/day	NA		NA	8.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.7E-03
				Copper	9.0E+02	mg/kg	3.2E-05	mg/kg/day	NA		NA	2.5E-04	mg/kg/day	4.0E-02	mg/kg/day	6.3E-03
				Iron	1.2E+04	mg/kg	4.2E-04	mg/kg/day	NA		NA	3.2E-03	mg/kg/day	7.0E-01	mg/kg/day	4.6E-03
				Manganese	2.4E+02	mg/kg	8.6E-06	mg/kg/day	NA		NA	6.7E-05	mg/kg/day	1.4E-01	mg/kg/day	4.8E-04

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Ingestion	Mercury	2.1E-01	mg/kg	7.4E-09	mg/kg/day	NA		NA	5.8E-08	mg/kg/day	1.0E-04	mg/kg/day	5.8E-04
				Vanadium	1.9E+01	mg/kg	6.7E-07	mg/kg/day	NA		NA	5.2E-06	mg/kg/day	5.0E-03	mg/kg/day	1.0E-03
			Exp. Route Total								1.5E-06					1.6E-01
			Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	8.5E-09	mg/kg/day	3.1E-01	mg/kg/day	2.6E-09	6.6E-08	mg/kg/day	2.0E-03	mg/kg/day	3.3E-05
				Benzo(a)anthracene	7.0E-02	mg/kg	3.7E-09	mg/kg/day	7.3E-01	mg/kg/day	2.7E-09	2.9E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	6.0E-09	mg/kg/day	7.3E+00	mg/kg/day	4.4E-08	4.7E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	4.8E-09	mg/kg/day	7.3E-01	mg/kg/day	3.5E-09	3.7E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	4.5E-09	mg/kg/day	7.3E-02	mg/kg/day	3.3E-10	3.5E-08	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	4.6E-09	mg/kg/day	7.3E-03	mg/kg/day	3.3E-11	3.6E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	2.4E-09	mg/kg/day	7.3E+00	mg/kg/day	1.7E-08	1.9E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	8.0E-09	mg/kg/day	7.3E-01	mg/kg/day	5.8E-09	6.2E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	3.8E-09	mg/kg/day	7.0E+00	mg/kg/day	2.7E-08	3.0E-08	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	1.6E-09	mg/kg/day	6.3E+00	mg/kg/day	1.0E-08	1.3E-08	mg/kg/day	8.0E-03	mg/kg/day	1.6E-06
				Aroclor-1254	3.2E+00	mg/kg	1.8E-07	mg/kg/day	2.0E+00	mg/kg/day	3.6E-07	1.4E-06	mg/kg/day	2.0E-05	mg/kg/day	7.1E-02
				Aroclor-1260	2.2E-01	mg/kg	1.3E-08	mg/kg/day	2.0E+00	mg/kg/day	2.5E-08	9.8E-08	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	1.4E-10	mg/kg/day	1.6E+01	mg/kg/day	2.3E-09	1.1E-09	mg/kg/day	5.0E-05	mg/kg/day	2.2E-05
				Heptachlor	1.7E-02	mg/kg	6.9E-10	mg/kg/day	4.5E+00	mg/kg/day	3.1E-09	5.4E-09	mg/kg/day	5.0E-04	mg/kg/day	1.1E-05
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	1.8E-08	mg/kg/day	3.0E-02	mg/kg/day	5.3E-10	1.4E-07	mg/kg/day	5.0E-04	mg/kg/day	2.7E-04
				Aluminum	2.6E+04	mg/kg	1.1E-04	mg/kg/day	NA		NA	8.3E-04	mg/kg/day	1.0E+00	mg/kg/day	8.3E-04
				Antimony	6.9E-01	mg/kg	2.8E-09	mg/kg/day	NA		NA	2.2E-08	mg/kg/day	6.0E-05	mg/kg/day	3.7E-04
				Arsenic	1.7E+01	mg/kg	2.0E-07	mg/kg/day	1.5E+00	mg/kg/day	3.0E-07	1.6E-06	mg/kg/day	3.0E-04	mg/kg/day	5.3E-03
				Cadmium	8.1E+01	mg/kg	3.3E-08	mg/kg/day	NA		NA	2.6E-07	mg/kg/day	2.5E-05	mg/kg/day	1.0E-02
				Chromium	1.7E+01	mg/kg	7.1E-08	mg/kg/day	2.0E+01	mg/kg/day	1.4E-06	5.5E-07	mg/kg/day	7.5E-05	mg/kg/day	7.3E-03
				Cobalt	2.9E+00	mg/kg	1.2E-08	mg/kg/day	NA		NA	9.1E-08	mg/kg/day	3.0E-04	mg/kg/day	3.0E-04
				Copper	9.0E+02	mg/kg	3.7E-06	mg/kg/day	NA		NA	2.9E-05	mg/kg/day	4.0E-02	mg/kg/day	7.2E-04
				Iron	1.2E+04	mg/kg	4.7E-05	mg/kg/day	NA		NA	3.7E-04	mg/kg/day	7.0E-01	mg/kg/day	5.3E-04
				Manganese	2.4E+02	mg/kg	9.8E-07	mg/kg/day	NA		NA	7.6E-06	mg/kg/day	1.4E-01	mg/kg/day	5.4E-05
				Mercury	2.1E-01	mg/kg	8.4E-10	mg/kg/day	NA		NA	6.6E-09	mg/kg/day	1.0E-04	mg/kg/day	6.6E-05
				Vanadium	1.9E+01	mg/kg	7.6E-08	mg/kg/day	NA		NA	5.9E-07	mg/kg/day	5.0E-03	mg/kg/day	1.2E-04
			Exp. Route Total								2.2E-06					9.7E-02
		Exposure Point Total									3.8E-06					2.6E-01
	Exposure Medium Total										3.8E-06					2.6E-01
	Air	Emissions from Soil* Across Site	Inhalation	Chromium	1.3E-08	mg/m^3	3.9E-11	mg/m^3	8.4E-02	$(ug/m3)^{-1}$	3.3E-09	3.0E-10	mg/m^3	1.0E-04	mg/m^3	3.0E-06
			Exp. Route Total								3.3E-09					3.0E-06
		Exposure Point Total									3.3E-09					3.0E-06
	Exposure Medium Total										3.3E-09					3.0E-06
Soil* Across Site											3.8E-06					2.6E-01

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.2E-02	mg/kg	2.6E-09	mg/kg/day	7.3E-01	mg/kg/day	1.9E-09	2.0E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	3.5E-09	mg/kg/day	7.3E+00	mg/kg/day	2.6E-08	2.7E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	3.5E-09	mg/kg/day	7.3E-01	mg/kg/day	2.5E-09	2.7E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	3.3E-09	mg/kg/day	7.3E-02	mg/kg/day	2.4E-10	2.6E-08	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	3.2E-09	mg/kg/day	7.3E-03	mg/kg/day	2.3E-11	2.5E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	1.6E-09	mg/kg/day	7.3E+00	mg/kg/day	1.2E-08	1.3E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	5.4E-09	mg/kg/day	7.3E-01	mg/kg/day	3.9E-09	4.2E-08	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	2.5E-04	mg/kg/day	NA		NA	2.0E-03	mg/kg/day	1.0E+00	mg/kg/day	2.0E-03
				Antimony	7.6E-01	mg/kg	2.7E-08	mg/kg/day	NA		NA	2.1E-07	mg/kg/day	4.0E-04	mg/kg/day	5.3E-04
				Arsenic	2.1E+01	mg/kg	7.4E-07	mg/kg/day	1.5E+00	mg/kg/day	1.1E-06	5.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.9E-02
				Chromium	1.4E+01	mg/kg	4.9E-07	mg/kg/day	5.0E-01	mg/kg/day	2.5E-07	3.8E-06	mg/kg/day	3.0E-03	mg/kg/day	1.3E-03
				Cobalt	2.8E+00	mg/kg	9.9E-08	mg/kg/day	NA		NA	7.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Iron	1.0E+04	mg/kg	3.6E-04	mg/kg/day	NA		NA	2.8E-03	mg/kg/day	7.0E-01	mg/kg/day	4.0E-03
				Manganese	1.3E+02	mg/kg	4.8E-06	mg/kg/day	NA		NA	3.7E-05	mg/kg/day	1.4E-01	mg/kg/day	2.7E-04
				Mercury	2.4E-01	mg/kg	8.5E-09	mg/kg/day	NA		NA	6.6E-08	mg/kg/day	1.0E-04	mg/kg/day	6.6E-04
				Vanadium	1.9E+01	mg/kg	6.8E-07	mg/kg/day	NA		NA	5.3E-06	mg/kg/day	5.0E-03	mg/kg/day	1.1E-03
			Exp. Route Total								1.4E-06					3.2E-02
			Dermal Absorption													
				Benzo(a)anthracene	7.2E-02	mg/kg	3.8E-09	mg/kg/day	7.3E-01	mg/kg/day	2.8E-09	3.0E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	5.2E-09	mg/kg/day	7.3E+00	mg/kg/day	3.8E-08	4.1E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	5.1E-09	mg/kg/day	7.3E-01	mg/kg/day	3.7E-09	4.0E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	4.9E-09	mg/kg/day	7.3E-02	mg/kg/day	3.6E-10	3.8E-08	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	4.7E-09	mg/kg/day	7.3E-03	mg/kg/day	3.5E-11	3.7E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	2.4E-09	mg/kg/day	7.3E+00	mg/kg/day	1.7E-08	1.9E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	8.0E-09	mg/kg/day	7.3E-01	mg/kg/day	5.8E-09	6.2E-08	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	2.9E-05	mg/kg/day	NA		NA	2.2E-04	mg/kg/day	1.0E+00	mg/kg/day	2.2E-04
				Antimony	7.6E-01	mg/kg	3.1E-09	mg/kg/day	NA		NA	2.4E-08	mg/kg/day	6.0E-05	mg/kg/day	4.0E-04
				Arsenic	2.1E+01	mg/kg	2.5E-07	mg/kg/day	1.5E+00	mg/kg/day	3.8E-07	2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	6.6E-03
				Chromium	1.4E+01	mg/kg	5.6E-08	mg/kg/day	2.0E+01	mg/kg/day	1.1E-06	4.4E-07	mg/kg/day	7.5E-05	mg/kg/day	5.8E-03
				Cobalt	2.8E+00	mg/kg	1.1E-08	mg/kg/day	NA		NA	8.8E-08	mg/kg/day	3.0E-04	mg/kg/day	2.9E-04
				Iron	1.0E+04	mg/kg	4.1E-05	mg/kg/day	NA		NA	3.2E-04	mg/kg/day	7.0E-01	mg/kg/day	4.6E-04
				Manganese	1.3E+02	mg/kg	5.4E-07	mg/kg/day	NA		NA	4.2E-06	mg/kg/day	1.4E-01	mg/kg/day	3.0E-05
				Mercury	2.4E-01	mg/kg	9.7E-10	mg/kg/day	NA		NA	7.6E-09	mg/kg/day	1.0E-04	mg/kg/day	7.6E-05
				Vanadium	1.9E+01	mg/kg	7.7E-08	mg/kg/day	NA		NA	6.0E-07	mg/kg/day	5.0E-03	mg/kg/day	1.2E-04
			Exp. Route Total								1.6E-06					1.4E-02
		Exposure Point Total									1.6E-06					4.6E-02

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Exposure Medium Total										3.0E-06					4.6E-02
	Air	Emissions from Soil Outside Waste Area	Inhalation	Chromium	1.0E-08	mg/m^3	3.1E-11	mg/m^3	8.4E-02	(ug/m3)$^{-1}$	2.6E-09	2.4E-10	mg/m^3	1.0E-04	mg/m^3	2.4E-06
			Exp. Route Total								2.6E-09					2.4E-06
		Exposure Point Total									2.6E-09					2.4E-06
	Exposure Medium Total										2.6E-09					2.4E-06
Soil* Outside Waste Area											3.0E-06					4.6E-02
							Total of Receptor Risks Across All Media				5.0E-06	Total of Receptor Hazards Across All Media				7.3E-01

bold indicates soil area with greatest risk

Notes-

NA = Not applicable.

Total is maximum of soil (in waste area, outside waste area, across site, or sludge area).

Soil* indicates combined surface and subsurface soil.

Generated by: Debbie Stannard/WDC 10/25/11

Checked by: Roni Warren (10/31/2011)

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDNECY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil in Waste Area	Ingestion													
				Benzo(a)pyrene	4.0E-02	mg/kg	2.2E-09	mg/kg/day	7.3E+00	mg/kg/day	1.6E-08	1.7E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	3.8E-02	mg/kg	2.1E-09	mg/kg/day	7.3E-01	mg/kg/day	1.5E-09	1.6E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	2.9E-02	mg/kg	1.6E-09	mg/kg/day	7.3E-02	mg/kg/day	1.2E-10	1.2E-08	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	3.3E-08	mg/kg/day	2.0E+00	mg/kg/day	6.5E-08	2.5E-07	mg/kg/day	2.0E-05	mg/kg/day	1.3E-02
				Aluminum	9.1E+03	mg/kg	5.0E-04	mg/kg/day	NA		NA	3.9E-03	mg/kg/day	1.0E+00	mg/kg/day	3.9E-03
				Arsenic	3.2E+00	mg/kg	1.8E-07	mg/kg/day	1.5E+00	mg/kg/day	2.6E-07	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.6E-03
				Cadmium	7.9E+02	mg/kg	4.3E-05	mg/kg/day	NA		NA	3.4E-04	mg/kg/day	1.0E-03	mg/kg/day	3.4E-01
				Chromium	1.3E+01	mg/kg	7.3E-07	mg/kg/day	5.0E-01	mg/kg/day	3.6E-07	5.7E-06	mg/kg/day	3.0E-03	mg/kg/day	1.9E-03
				Cobalt	3.4E+00	mg/kg	1.9E-07	mg/kg/day	NA		NA	1.5E-06	mg/kg/day	3.0E-04	mg/kg/day	4.9E-03
				Iron	7.5E+03	mg/kg	4.1E-04	mg/kg/day	NA		NA	3.2E-03	mg/kg/day	7.0E-01	mg/kg/day	4.6E-03
			Exp. Route Total								7.1E-07					3.7E-01
			Dermal Absorption													
				Benzo(a)pyrene	4.0E-02	mg/kg	3.8E-10	mg/kg/day	7.3E+00	mg/kg/day	2.8E-09	2.9E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	3.8E-02	mg/kg	3.6E-10	mg/kg/day	7.3E-01	mg/kg/day	2.6E-10	2.8E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	2.9E-02	mg/kg	2.7E-10	mg/kg/day	7.3E-02	mg/kg/day	2.0E-11	2.1E-09	mg/kg/day	NA		NA
				Aroclor-1254	5.9E-01	mg/kg	6.0E-09	mg/kg/day	2.0E+00	mg/kg/day	1.2E-08	4.7E-08	mg/kg/day	2.0E-05	mg/kg/day	2.3E-03
				Aluminum	9.1E+03	mg/kg	6.6E-06	mg/kg/day	NA		NA	5.1E-05	mg/kg/day	1.0E+00	mg/kg/day	5.1E-05
				Arsenic	3.2E+00	mg/kg	7.0E-09	mg/kg/day	1.5E+00	mg/kg/day	1.0E-08	5.4E-08	mg/kg/day	3.0E-04	mg/kg/day	1.8E-04
				Cadmium	7.9E+02	mg/kg	5.7E-08	mg/kg/day	NA		NA	4.4E-07	mg/kg/day	2.5E-05	mg/kg/day	1.8E-02
				Chromium	1.3E+01	mg/kg	9.6E-09	mg/kg/day	2.0E+01	mg/kg/day	1.9E-07	7.5E-08	mg/kg/day	7.5E-05	mg/kg/day	1.0E-03
				Cobalt	3.4E+00	mg/kg	2.5E-09	mg/kg/day	NA		NA	2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	6.5E-05
				Iron	7.5E+03	mg/kg	5.4E-06	mg/kg/day	NA		NA	4.2E-05	mg/kg/day	7.0E-01	mg/kg/day	6.0E-05
			Exp. Route Total								2.2E-07					2.1E-02
		Exposure Point Total									9.3E-07					3.9E-01
	Exposure Medium Total										9.3E-07					3.9E-01
Surface Soil In Waste Area											9.3E-07					**3.9E-01**
										Total of Receptor Risks Across All Media	9.3E-07				Total of Receptor Hazards Across All Media	3.9E-01

Notes-

bold indicates soil area with greatest risk or hazard index

NA = Not applicable.

Soil* indicates combined surface and subsurface soil.

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	NA	NA	NA	NA	NA	9.6E-07	mg/kg/day	2.0E-03	mg/kg/day	4.8E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	NA	NA	NA	NA	NA	1.9E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	NA	NA	NA	NA	NA	1.8E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	NA	NA	NA	NA	NA	2.6E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	NA	NA	NA	NA	NA	2.1E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	NA	NA	NA	NA	NA	2.3E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	4.3E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	NA	NA	NA	NA	NA	1.4E-07	mg/kg/day	8.0E-03	mg/kg/day	1.8E-05
				Aroclor-1254	1.2E+01	mg/kg	NA	NA	NA	NA	NA	5.3E-06	mg/kg/day	2.0E-05	mg/kg/day	2.7E-01
				Aroclor-1260	7.4E-01	mg/kg	NA	NA	NA	NA	NA	3.4E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	NA	NA	NA	NA	NA	1.8E-08	mg/kg/day	5.0E-05	mg/kg/day	3.6E-04
				Heptachlor	1.4E-01	mg/kg	NA	NA	NA	NA	NA	6.4E-08	mg/kg/day	5.0E-04	mg/kg/day	1.3E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	NA	NA	NA	NA	NA	1.9E-06	mg/kg/day	5.0E-04	mg/kg/day	3.8E-03
				Aluminum	9.0E+04	mg/kg	NA	NA	NA	NA	NA	4.1E-02	mg/kg/day	1.0E+00	mg/kg/day	4.1E-02
				Arsenic	2.9E+00	mg/kg	NA	NA	NA	NA	NA	1.3E-06	mg/kg/day	3.0E-04	mg/kg/day	4.4E-03
				Cadmium	5.0E+02	mg/kg	NA	NA	NA	NA	NA	2.3E-04	mg/kg/day	1.0E-03	mg/kg/day	2.3E-01
				Chromium	2.1E+01	mg/kg	NA	NA	NA	NA	NA	9.7E-06	mg/kg/day	3.0E-03	mg/kg/day	3.2E-03
				Cobalt	5.2E+00	mg/kg	NA	NA	NA	NA	NA	2.4E-06	mg/kg/day	3.0E-04	mg/kg/day	7.9E-03
				Copper	5.2E+03	mg/kg	NA	NA	NA	NA	NA	2.4E-03	mg/kg/day	4.0E-02	mg/kg/day	5.9E-02
				Iron	1.1E+04	mg/kg	NA	NA	NA	NA	NA	4.9E-03	mg/kg/day	7.0E-01	mg/kg/day	7.0E-03
				Manganese	7.5E+02	mg/kg	NA	NA	NA	NA	NA	3.4E-04	mg/kg/day	1.4E-01	mg/kg/day	2.4E-03
				Vanadium	3.4E+01	mg/kg	NA	NA	NA	NA	NA	1.5E-05	mg/kg/day	5.0E-03	mg/kg/day	3.1E-03
			Exp. Route Total								NA					6.3E-01
			Dermal Absorption	2,4-Dinitrotoluene	2.1E+00	mg/kg	NA	NA	NA	NA	NA	1.1E-07	mg/kg/day	2.0E-03	mg/kg/day	5.5E-05
				Benzo(a)anthracene	4.2E-02	mg/kg	NA	NA	NA	NA	NA	2.9E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	NA	NA	NA	NA	NA	2.7E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	NA	NA	NA	NA	NA	3.8E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	NA	NA	NA	NA	NA	3.1E-09	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	NA	NA	NA	NA	NA	3.4E-09	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	4.9E-09	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	NA	NA	NA	NA	NA	1.6E-08	mg/kg/day	8.0E-03	mg/kg/day	2.0E-06
				Aroclor-1254	1.2E+01	mg/kg	NA	NA	NA	NA	NA	8.5E-07	mg/kg/day	2.0E-05	mg/kg/day	4.2E-02
				Aroclor-1260	7.4E-01	mg/kg	NA	NA	NA	NA	NA	5.4E-08	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	NA	NA	NA	NA	NA	2.1E-09	mg/kg/day	5.0E-05	mg/kg/day	4.2E-05
				Heptachlor	1.4E-01	mg/kg	NA	NA	NA	NA	NA	7.3E-09	mg/kg/day	5.0E-04	mg/kg/day	1.5E-05
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	NA	NA	NA	NA	NA	6.8E-08	mg/kg/day	5.0E-04	mg/kg/day	1.4E-04
				Aluminum	9.0E+04	mg/kg	NA	NA	NA	NA	NA	4.7E-04	mg/kg/day	1.0E+00	mg/kg/day	4.7E-04
				Arsenic	2.9E+00	mg/kg	NA	NA	NA	NA	NA	4.5E-08	mg/kg/day	3.0E-04	mg/kg/day	1.5E-04
				Cadmium	5.0E+02	mg/kg	NA	NA	NA	NA	NA	2.6E-07	mg/kg/day	2.5E-05	mg/kg/day	1.1E-02

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Chromium	2.1E+01	mg/kg	NA	NA	NA	NA	NA	1.1E-07	mg/kg/day	7.5E-05	mg/kg/day	1.5E-03
				Cobalt	5.2E+00	mg/kg	NA	NA	NA	NA	NA	2.7E-08	mg/kg/day	3.0E-04	mg/kg/day	9.0E-05
				Copper	5.2E+03	mg/kg	NA	NA	NA	NA	NA	2.7E-05	mg/kg/day	4.0E-02	mg/kg/day	6.7E-04
				Iron	1.1E+04	mg/kg	NA	NA	NA	NA	NA	5.6E-05	mg/kg/day	7.0E-01	mg/kg/day	8.0E-05
				Manganese	7.5E+02	mg/kg	NA	NA	NA	NA	NA	3.9E-06	mg/kg/day	1.4E-01	mg/kg/day	2.8E-05
				Vanadium	3.4E+01	mg/kg	NA	NA	NA	NA	NA	1.8E-07	mg/kg/day	5.0E-03	mg/kg/day	3.5E-05
			Exp. Route Total								NA					5.6E-02
		Exposure Point Total									NA					6.9E-01
	Exposure Medium Total										NA					6.9E-01
Soil* In Waste Area											NA					6.9E-01
Groundwater	Groundwater	Yorktown-Eastover Deep Aquifer Tap Water	Ingestion	Heptachlor epoxide	9.8E-03	ug/L	NA	NA	NA	NA	NA	1.3E-07	mg/kg/day	1.3E-05	mg/kg/day	9.7E-03
				Manganese	1.1E+02	ug/L	NA	NA	NA	NA	NA	1.4E-03	mg/kg/day	2.4E-02	mg/kg/day	6.0E-02
			Exp. Route Total								N/A					7.0E-02
			Dermal Absorption	Heptachlor epoxide	9.8E-03	ug/L	NA	NA	NA	NA	NA	1.9E-07	mg/kg/day	1.3E-05	mg/kg/day	1.4E-02
				Manganese	1.1E+02	ug/L	NA	NA	NA	NA	NA	4.7E-06	mg/kg/day	9.6E-04	mg/kg/day	4.9E-03
			Exp. Route Total								NA					1.9E-02
		Exposure Point Total									NA					8.9E-02
	Exposure Medium Total										NA					8.9E-02
Deep Aquifer Groundwater Total											NA					8.9E-02
									Total of Receptor Risks Across All Media		NA	Total of Receptor Hazards Across All Media				7.7E-01

Notes-

NA = Not applicable.

DA_{event} for dermal exposure to groundwater calculated on Table 7.2.CTE Supplements A and B

Soil* indicates combined surface and subsurface soil.

Table 7.2.CTE Supplement A
Calculation of DAevent
Site 24
NWS Yorktown, Yorktown, Virginia

Chemical	**MW**	**Kp (cm/hr)**	**B[1]**	**Dsc/lsc[1]**	**lsc (cm)**	**Dsc (cm^2/hr)**	**τ[1] (hr)**	**c[1]**	**b[1]**	**t*[1] (hr)**
Heptachlor epoxide	389	2.1E-02	1.6E-01	1.1E-05	1.0E-03	1.1E-08	1.6E+01	4.5E-01	4.1E-01	3.8E+01
RDX	222	3.4E-04	1.9E-03	9.1E-05	1.0E-03	9.1E-08	1.8E+00	3.3E-01	3.0E-01	4.4E+00

1. Equations from *Dermal Exposure Assessment: Principles and Applications* . EPA/600/8-91/011B. January 1992.
Parameter values from RAIS database (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

Table 7.2.CTE Supplement B
Calculation of DAevent
Resident Adult Deep Ground Water
Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Heptachlor epoxide[1]	9.8E-03	2.1E-02	1.6E-01	1.6E+01	3.8E+01	1.0E+00	0.25	1.1E-09	2
Manganese	1.1E+02	1.0E-03	N/A	N/A	N/A	N/A	0.25	2.8E-08	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If t_{event} < t* then

$$DA_{event} = 2 \times FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \sqrt{\frac{6 \times \tau_{event} \times t_{event}}{\pi}} \qquad \text{(eq 2)}$$

If t_{event} > t* then

$$DA_{event} = FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \left[\frac{t_{event}}{1+B} + 2 \times \tau_{event} \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right] \qquad \text{(eq 3)}$$

Notes:
NA - Not applicable
Permeability constants and other input parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.2.CTE Supplement A. Permeability constants from RAIS databases (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	NA	NA	NA	NA	NA	9.0E-06	mg/kg/day	2.0E-03	mg/kg/day	4.5E-03
				Benzo(a)anthracene	4.2E-02	mg/kg	NA	NA	NA	NA	NA	1.8E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	NA	NA	NA	NA	NA	1.7E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	NA	NA	NA	NA	NA	2.4E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	NA	NA	NA	NA	NA	2.0E-07	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	NA	NA	NA	NA	NA	2.1E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	4.0E-07	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	NA	NA	NA	NA	NA	1.3E-06	mg/kg/day	8.0E-03	mg/kg/day	1.6E-04
				Aroclor-1254	1.2E+01	mg/kg	NA	NA	NA	NA	NA	5.0E-05	mg/kg/day	2.0E-05	mg/kg/day	2.5E+00
				Aroclor-1260	7.4E-01	mg/kg	NA	NA	NA	NA	NA	3.2E-06	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	NA	NA	NA	NA	NA	1.7E-07	mg/kg/day	5.0E-05	mg/kg/day	3.4E-03
				Heptachlor	1.4E-01	mg/kg	NA	NA	NA	NA	NA	6.0E-07	mg/kg/day	5.0E-04	mg/kg/day	1.2E-03
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	NA	NA	NA	NA	NA	1.8E-05	mg/kg/day	5.0E-04	mg/kg/day	3.5E-02
				Aluminum	9.0E+04	mg/kg	NA	NA	NA	NA	NA	3.8E-01	mg/kg/day	1.0E+00	mg/kg/day	3.8E-01
				Arsenic	2.9E+00	mg/kg	NA	NA	NA	NA	NA	1.2E-05	mg/kg/day	3.0E-04	mg/kg/day	4.1E-02
				Cadmium	5.0E+02	mg/kg	NA	NA	NA	NA	NA	2.2E-03	mg/kg/day	1.0E-03	mg/kg/day	2.2E+00
				Chromium	2.1E+01	mg/kg	NA	NA	NA	NA	NA	9.1E-05	mg/kg/day	3.0E-03	mg/kg/day	3.0E-02
				Cobalt	5.2E+00	mg/kg	NA	NA	NA	NA	NA	2.2E-05	mg/kg/day	3.0E-04	mg/kg/day	7.4E-02
				Copper	5.2E+03	mg/kg	NA	NA	NA	NA	NA	2.2E-02	mg/kg/day	4.0E-02	mg/kg/day	5.5E-01
				Iron	1.1E+04	mg/kg	NA	NA	NA	NA	NA	4.6E-02	mg/kg/day	7.0E-01	mg/kg/day	6.5E-02
				Manganese	7.5E+02	mg/kg	NA	NA	NA	NA	NA	3.2E-03	mg/kg/day	1.4E-01	mg/kg/day	2.3E-02
				Vanadium	3.4E+01	mg/kg	NA	NA	NA	NA	NA	1.4E-04	mg/kg/day	5.0E-03	mg/kg/day	2.9E-02
			Exp. Route Total								NA					5.9E+00
			Dermal Absorption	2,4-Dinitrotoluene	2.1E+00	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	2.0E-03	mg/kg/day	5.0E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	NA	NA	NA	NA	NA	2.6E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	NA	NA	NA	NA	NA	2.5E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	NA	NA	NA	NA	NA	3.5E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	NA	NA	NA	NA	NA	2.9E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	NA	NA	NA	NA	NA	3.1E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	4.5E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	NA	NA	NA	NA	NA	1.5E-07	mg/kg/day	8.0E-03	mg/kg/day	1.8E-05
				Aroclor-1254	1.2E+01	mg/kg	NA	NA	NA	NA	NA	7.8E-06	mg/kg/day	2.0E-05	mg/kg/day	3.9E-01
				Aroclor-1260	7.4E-01	mg/kg	NA	NA	NA	NA	NA	4.9E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	NA	NA	NA	NA	NA	1.9E-08	mg/kg/day	5.0E-05	mg/kg/day	3.8E-04
				Heptachlor	1.4E-01	mg/kg	NA	NA	NA	NA	NA	6.7E-08	mg/kg/day	5.0E-04	mg/kg/day	1.3E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	NA	NA	NA	NA	NA	6.3E-07	mg/kg/day	5.0E-04	mg/kg/day	1.3E-03
				Aluminum	9.0E+04	mg/kg	NA	NA	NA	NA	NA	4.3E-03	mg/kg/day	1.0E+00	mg/kg/day	4.3E-03
				Arsenic	2.9E+00	mg/kg	NA	NA	NA	NA	NA	4.2E-07	mg/kg/day	3.0E-04	mg/kg/day	1.4E-03
				Cadmium	5.0E+02	mg/kg	NA	NA	NA	NA	NA	2.4E-06	mg/kg/day	2.5E-05	mg/kg/day	9.6E-02

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Chromium	2.1E+01	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	7.5E-05	mg/kg/day	1.4E-02
				Cobalt	5.2E+00	mg/kg	NA	NA	NA	NA	NA	2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	8.2E-04
				Copper	5.2E+03	mg/kg	NA	NA	NA	NA	NA	2.5E-04	mg/kg/day	4.0E-02	mg/kg/day	6.2E-03
				Iron	1.1E+04	mg/kg	NA	NA	NA	NA	NA	5.1E-04	mg/kg/day	7.0E-01	mg/kg/day	7.3E-04
				Manganese	7.5E+02	mg/kg	NA	NA	NA	NA	NA	3.6E-05	mg/kg/day	1.4E-01	mg/kg/day	2.5E-04
				Vanadium	3.4E+01	mg/kg	NA	NA	NA	NA	NA	1.6E-06	mg/kg/day	5.0E-03	mg/kg/day	3.2E-04
			Exp. Route Total								NA					5.1E-01
		Exposure Point Total									NA					6.4E+00
	Exposure Medium Total										NA					6.4E+00
Soil* In Waste Area											NA					6.4E+00
Soil*	Soil*	Soil Outside Waste Area	Ingestion													
				Benzo(a)anthracene	7.2E-02	mg/kg	NA	NA	NA	NA	NA	3.1E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	NA	NA	NA	NA	NA	4.2E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	NA	NA	NA	NA	NA	4.1E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	NA	NA	NA	NA	NA	4.0E-07	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	NA	NA	NA	NA	NA	3.8E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	1.9E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	6.4E-07	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	NA	NA	NA	NA	NA	3.0E-02	mg/kg/day	1.0E+00	mg/kg/day	3.0E-02
				Antimony	7.6E-01	mg/kg	NA	NA	NA	NA	NA	3.3E-06	mg/kg/day	4.0E-04	mg/kg/day	8.1E-03
				Arsenic	2.1E+01	mg/kg	NA	NA	NA	NA	NA	8.8E-05	mg/kg/day	3.0E-04	mg/kg/day	2.9E-01
				Chromium	1.4E+01	mg/kg	NA	NA	NA	NA	NA	5.8E-05	mg/kg/day	3.0E-03	mg/kg/day	1.9E-02
				Cobalt	2.8E+00	mg/kg	NA	NA	NA	NA	NA	1.2E-05	mg/kg/day	3.0E-04	mg/kg/day	4.0E-02
				Iron	1.0E+04	mg/kg	NA	NA	NA	NA	NA	4.3E-02	mg/kg/day	7.0E-01	mg/kg/day	6.2E-02
				Manganese	1.3E+02	mg/kg	NA	NA	NA	NA	NA	5.7E-04	mg/kg/day	1.4E-01	mg/kg/day	4.1E-03
				Mercury	2.4E-01	mg/kg	NA	NA	NA	NA	NA	1.0E-06	mg/kg/day	1.0E-04	mg/kg/day	1.0E-02
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	8.0E-05	mg/kg/day	5.0E-03	mg/kg/day	1.6E-02
			Exp. Route Total								NA					4.8E-01
			Dermal Absorption													
				Benzo(a)anthracene	7.2E-02	mg/kg	NA	NA	NA	NA	NA	4.5E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	9.8E-02	mg/kg	NA	NA	NA	NA	NA	6.1E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.6E-02	mg/kg	NA	NA	NA	NA	NA	6.0E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	9.3E-02	mg/kg	NA	NA	NA	NA	NA	5.8E-08	mg/kg/day	NA		NA
				Chrysene	8.9E-02	mg/kg	NA	NA	NA	NA	NA	5.5E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	2.8E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	9.3E-08	mg/kg/day	NA		NA
				Aluminum	7.0E+03	mg/kg	NA	NA	NA	NA	NA	3.3E-04	mg/kg/day	1.0E+00	mg/kg/day	3.3E-04
				Antimony	7.6E-01	mg/kg	NA	NA	NA	NA	NA	3.6E-08	mg/kg/day	6.0E-05	mg/kg/day	6.1E-04
				Arsenic	2.1E+01	mg/kg	NA	NA	NA	NA	NA	3.0E-06	mg/kg/day	3.0E-04	mg/kg/day	9.9E-03
				Chromium	1.4E+01	mg/kg	NA	NA	NA	NA	NA	6.5E-07	mg/kg/day	7.5E-05	mg/kg/day	8.7E-03
				Cobalt	2.8E+00	mg/kg	NA	NA	NA	NA	NA	1.3E-07	mg/kg/day	3.0E-04	mg/kg/day	4.5E-04

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil Outside Waste Area (cont'd)	Dermal Absorption	Iron	1.0E+04	mg/kg	NA	NA	NA	NA	NA	4.9E-04	mg/kg/day	7.0E-01	mg/kg/day	6.9E-04
				Manganese	1.3E+02	mg/kg	NA	NA	NA	NA	NA	6.4E-06	mg/kg/day	1.4E-01	mg/kg/day	4.6E-05
				Mercury	2.4E-01	mg/kg	NA	NA	NA	NA	NA	1.1E-08	mg/kg/day	1.0E-04	mg/kg/day	1.1E-04
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	9.0E-07	mg/kg/day	5.0E-03	mg/kg/day	1.8E-04
			Exp. Route Total								NA					2.1E-02
		Exposure Point Total									NA					5.0E-01
	Exposure Medium Total										NA					5.0E-01
Soil* Outside Waste Area											NA					5.0E-01
Soil*	Soil*	Soil Across Site	Ingestion	2,4-Dinitrotoluene	2.1E-01	mg/kg	NA	NA	NA	NA	NA	8.9E-07	mg/kg/day	2.0E-03	mg/kg/day	4.4E-04
				Benzo(a)anthracene	7.0E-02	mg/kg	NA	NA	NA	NA	NA	3.0E-07	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	NA	NA	NA	NA	NA	4.8E-07	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	NA	NA	NA	NA	NA	3.8E-07	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	NA	NA	NA	NA	NA	3.6E-07	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	NA	NA	NA	NA	NA	3.7E-07	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	1.9E-07	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	6.4E-07	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	4.0E-07	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	NA	NA	NA	NA	NA	1.7E-07	mg/kg/day	8.0E-03	mg/kg/day	2.1E-05
				Aroclor-1254	3.2E+00	mg/kg	NA	NA	NA	NA	NA	1.4E-05	mg/kg/day	2.0E-05	mg/kg/day	6.8E-01
				Aroclor-1260	2.2E-01	mg/kg	NA	NA	NA	NA	NA	9.4E-07	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	NA	NA	NA	NA	NA	1.5E-08	mg/kg/day	5.0E-05	mg/kg/day	3.0E-04
				Heptachlor	1.7E-02	mg/kg	NA	NA	NA	NA	NA	7.2E-08	mg/kg/day	5.0E-04	mg/kg/day	1.4E-04
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	NA	NA	NA	NA	NA	5.7E-06	mg/kg/day	5.0E-04	mg/kg/day	1.1E-02
				Aluminum	2.6E+04	mg/kg	NA	NA	NA	NA	NA	1.1E-01	mg/kg/day	1.0E+00	mg/kg/day	1.1E-01
				Antimony	6.9E-01	mg/kg	NA	NA	NA	NA	NA	3.0E-06	mg/kg/day	4.0E-04	mg/kg/day	7.4E-03
				Arsenic	1.7E+01	mg/kg	NA	NA	NA	NA	NA	7.1E-05	mg/kg/day	3.0E-04	mg/kg/day	2.4E-01
				Cadmium	8.1E+01	mg/kg	NA	NA	NA	NA	NA	3.5E-04	mg/kg/day	1.0E-03	mg/kg/day	3.5E-01
				Chromium	1.7E+01	mg/kg	NA	NA	NA	NA	NA	7.4E-05	mg/kg/day	3.0E-03	mg/kg/day	2.5E-02
				Cobalt	2.9E+00	mg/kg	NA	NA	NA	NA	NA	1.2E-05	mg/kg/day	3.0E-04	mg/kg/day	4.1E-02
				Copper	9.0E+02	mg/kg	NA	NA	NA	NA	NA	3.9E-03	mg/kg/day	4.0E-02	mg/kg/day	9.6E-02
				Iron	1.2E+04	mg/kg	NA	NA	NA	NA	NA	4.9E-02	mg/kg/day	7.0E-01	mg/kg/day	7.1E-02
				Manganese	2.4E+02	mg/kg	NA	NA	NA	NA	NA	1.0E-03	mg/kg/day	1.4E-01	mg/kg/day	7.3E-03

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Ingestion	Mercury	2.1E-01	mg/kg	NA	NA	NA	NA	NA	8.8E-07	mg/kg/day	1.0E-04	mg/kg/day	8.8E-03
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	7.9E-05	mg/kg/day	5.0E-03	mg/kg/day	1.6E-02
			Exp. Route Total								NA					1.7E+00
			Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	NA	NA	NA	NA	NA	1.0E-07	mg/kg/day	2.0E-03	mg/kg/day	5.0E-05
				Benzo(a)anthracene	7.0E-02	mg/kg	NA	NA	NA	NA	NA	4.4E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	1.1E-01	mg/kg	NA	NA	NA	NA	NA	7.0E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	9.0E-02	mg/kg	NA	NA	NA	NA	NA	5.6E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	8.5E-02	mg/kg	NA	NA	NA	NA	NA	5.3E-08	mg/kg/day	NA		NA
				Chrysene	8.6E-02	mg/kg	NA	NA	NA	NA	NA	5.3E-08	mg/kg/day	NA		NA
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	NA	NA	NA	NA	NA	2.8E-08	mg/kg/day	NA		NA
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	NA	NA	NA	NA	NA	9.3E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	NA	NA	NA	NA	NA	4.5E-08	mg/kg/day	NA		NA
				alpha-BHC	3.9E-02	mg/kg	NA	NA	NA	NA	NA	1.9E-08	mg/kg/day	8.0E-03	mg/kg/day	2.4E-06
				Aroclor-1254	3.2E+00	mg/kg	NA	NA	NA	NA	NA	2.1E-06	mg/kg/day	2.0E-05	mg/kg/day	1.1E-01
				Aroclor-1260	2.2E-01	mg/kg	NA	NA	NA	NA	NA	1.5E-07	mg/kg/day	NA		NA
				Dieldrin	3.5E-03	mg/kg	NA	NA	NA	NA	NA	1.7E-09	mg/kg/day	5.0E-05	mg/kg/day	3.3E-05
				Heptachlor	1.7E-02	mg/kg	NA	NA	NA	NA	NA	8.1E-09	mg/kg/day	5.0E-04	mg/kg/day	1.6E-05
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	NA	NA	NA	NA	NA	2.1E-07	mg/kg/day	5.0E-04	mg/kg/day	4.1E-04
				Aluminum	2.6E+04	mg/kg	NA	NA	NA	NA	NA	1.2E-03	mg/kg/day	1.0E+00	mg/kg/day	1.2E-03
				Antimony	6.9E-01	mg/kg	NA	NA	NA	NA	NA	3.3E-08	mg/kg/day	6.0E-05	mg/kg/day	5.5E-04
				Arsenic	1.7E+01	mg/kg	NA	NA	NA	NA	NA	2.4E-06	mg/kg/day	3.0E-04	mg/kg/day	7.9E-03
				Cadmium	8.1E+01	mg/kg	NA	NA	NA	NA	NA	3.9E-07	mg/kg/day	2.5E-05	mg/kg/day	1.6E-02
				Chromium	1.7E+01	mg/kg	NA	NA	NA	NA	NA	8.3E-07	mg/kg/day	7.5E-05	mg/kg/day	1.1E-02
				Cobalt	2.9E+00	mg/kg	NA	NA	NA	NA	NA	1.4E-07	mg/kg/day	3.0E-04	mg/kg/day	4.6E-04
				Copper	9.0E+02	mg/kg	NA	NA	NA	NA	NA	4.3E-05	mg/kg/day	4.0E-02	mg/kg/day	1.1E-03
				Iron	1.2E+04	mg/kg	NA	NA	NA	NA	NA	5.5E-04	mg/kg/day	7.0E-01	mg/kg/day	7.9E-04
				Manganese	2.4E+02	mg/kg	NA	NA	NA	NA	NA	1.1E-05	mg/kg/day	1.4E-01	mg/kg/day	8.2E-05
				Mercury	2.1E-01	mg/kg	NA	NA	NA	NA	NA	9.9E-09	mg/kg/day	1.0E-04	mg/kg/day	9.9E-05
				Vanadium	1.9E+01	mg/kg	NA	NA	NA	NA	NA	8.9E-07	mg/kg/day	5.0E-03	mg/kg/day	1.8E-04
			Exp. Route Total								NA					1.5E-01
		Exposure Point Total									NA					1.8E+00
	Exposure Medium Total										NA					1.8E+00
Soil* Across Site											NA					1.8E+00

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Yorktown-Eastover Deep Aquifer Tap Water	Ingestion	Heptachlor epoxide	9.8E-03	ug/L	NA	NA	NA	NA	NA	4.2E-07	mg/kg/day	1.3E-05	mg/kg/day	3.2E-02
				Manganese	1.1E+02	ug/L	NA	NA	NA	NA	NA	4.8E-03	mg/kg/day	2.4E-02	mg/kg/day	2.0E-01
			Exp. Route Total								N/A					2.3E-01
			Dermal Absorption	Heptachlor epoxide	9.8E-03	ug/L	NA	NA	NA	NA	NA	3.7E-07	mg/kg/day	1.3E-05	mg/kg/day	2.8E-02
				Manganese	1.1E+02	ug/L	NA	NA	NA	NA	NA	1.1E-05	mg/kg/day	9.6E-04	mg/kg/day	1.1E-02
			Exp. Route Total								NA					3.9E-02
		Exposure Point Total									NA					2.7E-01
	Exposure Medium Total										NA					2.7E-01
Deep Aquifer Groundwater Total											NA					2.7E-01
Total of Receptor Risks Across All Media											NA	Total of Receptor Hazards Across All Media				6.7E+00

Notes-

NA = Not applicable.

DA_{event} for dermal exposure to groundwater calculated on Table 7.3.CTE Supplement A

Table 7.3.CTE Supplement A
Calculation of DAevent
Resident Child Deep Ground Water
Site 24, NWS Yorktown, Yorktown, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Heptachlor epoxide[1]	9.8E-03	2.1E-02	1.6E-01	1.6E+01	3.8E+01	1.0E+00	0.33	1.3E-09	2
Manganese	1.1E+02	1.0E-03	N/A	N/A	N/A	N/A	0.33	3.7E-08	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If t_{event} < t* then

$$DA_{event} = 2 \times FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \sqrt{\frac{6 \times \tau_{event} \times t_{event}}{\pi}} \qquad \text{(eq 2)}$$

If t_{event} > t* then

$$DA_{event} = FA \times K_p \times C_w \times 0.001 \quad mg/ug \times 0.001 \quad l/cm^3 \left[\frac{t_{event}}{1+B} + 2 \times \tau_{event} \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right] \qquad \text{(eq 3)}$$

Notes:
NA - Not applicable
Permeability constants and other input parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.2.CTE Supplement B. Permeability constants from RAIS databases (http://rais.ornl.gov/cgi-bin/tools/TOX_search).

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	8.9E-07	mg/kg/day	3.1E-01	mg/kg/day	2.8E-07	NA	NA	NA	NA	NA
				Benzo(a)anthracene[1]	4.2E-02	mg/kg			7.3E-01	mg/kg/day	6.6E-08	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	4.0E-02	mg/kg			7.3E+00	mg/kg/day	6.3E-07	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	5.6E-02	mg/kg			7.3E-01	mg/kg/day	8.8E-08	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	4.6E-02	mg/kg			7.3E-02	mg/kg/day	7.2E-09	NA	NA	NA	NA	NA
				Chrysene[1]	5.0E-02	mg/kg			7.3E-03	mg/kg/day	7.8E-10	NA	NA	NA	NA	NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	4.0E-08	mg/kg/day	7.0E+00	mg/kg/day	2.8E-07	NA	NA	NA	NA	NA
				alpha-BHC	3.1E-01	mg/kg	1.3E-07	mg/kg/day	6.3E+00	mg/kg/day	8.3E-07	NA	NA	NA	NA	NA
				Aroclor-1254	1.2E+01	mg/kg	4.9E-06	mg/kg/day	2.0E+00	mg/kg/day	9.9E-06	NA	NA	NA	NA	NA
				Aroclor-1260	7.4E-01	mg/kg	3.1E-07	mg/kg/day	2.0E+00	mg/kg/day	6.3E-07	NA	NA	NA	NA	NA
				Dieldrin	4.0E-02	mg/kg	1.7E-08	mg/kg/day	1.6E+01	mg/kg/day	2.7E-07	NA	NA	NA	NA	NA
				Heptachlor	1.4E-01	mg/kg	6.0E-08	mg/kg/day	4.5E+00	mg/kg/day	2.7E-07	NA	NA	NA	NA	NA
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	1.7E-06	mg/kg/day	3.0E-02	mg/kg/day	5.2E-08	NA	NA	NA	NA	NA
				Aluminum	9.0E+04	mg/kg	3.8E-02	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Arsenic	2.9E+00	mg/kg	1.2E-06	mg/kg/day	1.5E+00	mg/kg/day	1.8E-06	NA	NA	NA	NA	NA
				Cadmium	5.0E+02	mg/kg	2.1E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Chromium[1]	2.1E+01	mg/kg			5.0E-01	mg/kg/day	2.3E-05	NA	NA	NA	NA	NA
				Cobalt	5.2E+00	mg/kg	2.2E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Copper	5.2E+03	mg/kg	2.2E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Iron	1.1E+04	mg/kg	4.5E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Manganese	7.5E+02	mg/kg	3.2E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Vanadium	3.4E+01	mg/kg	1.4E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								3.8E-05					NA
			Dermal Absorption													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	1.0E-07	mg/kg/day	3.1E-01	mg/kg/day	3.1E-08	NA	NA	NA	NA	NA
				Benzo(a)anthracene[1]	4.2E-02	mg/kg			7.3E-01	mg/kg/day	1.2E-08	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	4.0E-02	mg/kg			7.3E+00	mg/kg/day	1.2E-07	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	5.6E-02	mg/kg			7.3E-01	mg/kg/day	1.6E-08	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	4.6E-02	mg/kg			7.3E-02	mg/kg/day	1.3E-09	NA	NA	NA	NA	NA
				Chrysene[1]	5.0E-02	mg/kg			7.3E-03	mg/kg/day	1.5E-10	NA	NA	NA	NA	NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	4.4E-09	mg/kg/day	7.0E+00	mg/kg/day	3.1E-08	NA	NA	NA	NA	NA
				alpha-BHC	3.1E-01	mg/kg	1.5E-08	mg/kg/day	6.3E+00	mg/kg/day	9.3E-08	NA	NA	NA	NA	NA
				Aroclor-1254	1.2E+01	mg/kg	7.8E-07	mg/kg/day	2.0E+00	mg/kg/day	1.6E-06	NA	NA	NA	NA	NA
				Aroclor-1260	7.4E-01	mg/kg	4.9E-08	mg/kg/day	2.0E+00	mg/kg/day	9.9E-08	NA	NA	NA	NA	NA
				Dieldrin	4.0E-02	mg/kg	1.9E-09	mg/kg/day	1.6E+01	mg/kg/day	3.0E-08	NA	NA	NA	NA	NA
				Heptachlor	1.4E-01	mg/kg	6.7E-09	mg/kg/day	4.5E+00	mg/kg/day	3.0E-08	NA	NA	NA	NA	NA
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	6.3E-08	mg/kg/day	3.0E-02	mg/kg/day	1.9E-09	NA	NA	NA	NA	NA
				Aluminum	9.0E+04	mg/kg	4.3E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Arsenic	2.9E+00	mg/kg	4.2E-08	mg/kg/day	1.5E+00	mg/kg/day	6.2E-08	NA	NA	NA	NA	NA
				Cadmium	5.0E+02	mg/kg	2.4E-07	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Chromium[1]	2.1E+01	mg/kg			2.0E+01	mg/kg/day	1.3E-05	NA	NA	NA	NA	NA
				Cobalt	5.2E+00	mg/kg	2.5E-08	mg/kg/day	NA		NA	NA	NA	NA	NA	NA

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal	Copper	5.2E+03	mg/kg	2.5E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Iron	1.1E+04	mg/kg	5.1E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Manganese	7.5E+02	mg/kg	3.6E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Vanadium	3.4E+01	mg/kg	1.6E-07	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								1.5E-05					NA
		Exposure Point Total									5.3E-05					NA
	Exposure Medium Total										5.3E-05					NA
	Air	Emissions from Soil* in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3			8.4E-02	$(ug/m3)^{-1}$	7.4E-07	NA	NA	NA	NA	NA
			Exp. Route Total								7.4E-07					NA
		Exposure Point Total									7.4E-07					NA
	Exposure Medium Total										7.4E-07					NA
Soil* In Waste Area											5.4E-05					NA
Soil*	Soil*	Soil Outside Waste Area	Ingestion	Benzo(a)anthracene[1]	7.2E-02	mg/kg			7.3E-01	mg/kg/day	1.1E-07	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	9.8E-02	mg/kg			7.3E+00	mg/kg/day	1.5E-06	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	9.6E-02	mg/kg			7.3E-01	mg/kg/day	1.5E-07	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	9.3E-02	mg/kg			7.3E-02	mg/kg/day	1.5E-08	NA	NA	NA	NA	NA
				Chrysene[1]	8.9E-02	mg/kg			7.3E-03	mg/kg/day	1.4E-09	NA	NA	NA	NA	NA
				Dibenz(a,h)anthracene[1]	4.5E-02	mg/kg			7.3E+00	mg/kg/day	7.1E-07	NA	NA	NA	NA	NA
				Indeno(1,2,3-cd)pyrene[1]	1.5E-01	mg/kg			7.3E-01	mg/kg/day	2.4E-07	NA	NA	NA	NA	NA
				Aluminum	7.0E+03	mg/kg	3.0E-03	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Antimony	7.6E-01	mg/kg	3.2E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Arsenic	2.1E+01	mg/kg	8.8E-06	mg/kg/day	1.5E+00	mg/kg/day	1.3E-05	NA	NA	NA	NA	NA
				Chromium[1]	1.4E+01	mg/kg			5.0E-01	mg/kg/day	1.5E-05	NA	NA	NA	NA	NA
				Cobalt	2.8E+00	mg/kg	1.2E-06	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Iron	1.0E+04	mg/kg	4.3E-03	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Manganese	1.3E+02	mg/kg	5.7E-05	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Mercury	2.4E-01	mg/kg	1.0E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Vanadium	1.9E+01	mg/kg	8.0E-06	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
			Exp. Route Total								3.1E-05					NA
			Dermal Absorption	Benzo(a)anthracene[1]	7.2E-02	mg/kg			7.3E-01	mg/kg/day	2.1E-08	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	9.8E-02	mg/kg			7.3E+00	mg/kg/day	2.9E-07	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	9.6E-02	mg/kg			7.3E-01	mg/kg/day	2.8E-08	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	9.3E-02	mg/kg			7.3E-02	mg/kg/day	2.7E-09	NA	NA	NA	NA	NA
				Chrysene[1]	8.9E-02	mg/kg			7.3E-03	mg/kg/day	2.6E-10	NA	NA	NA	NA	NA
				Dibenz(a,h)anthracene[1]	4.5E-02	mg/kg			7.3E+00	mg/kg/day	1.3E-07	NA	NA	NA	NA	NA
				Indeno(1,2,3-cd)pyrene[1]	1.5E-01	mg/kg			7.3E-01	mg/kg/day	4.4E-08	NA	NA	NA	NA	NA
				Aluminum	7.0E+03	mg/kg	3.3E-05	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Antimony	7.6E-01	mg/kg	3.6E-09	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Arsenic	2.1E+01	mg/kg	3.0E-07	mg/kg/day	1.5E+00	mg/kg/day	4.4E-07	NA	NA	NA	NA	NA

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil Outside Waste Area	Dermal Absorption	Chromium[1]	1.4E+01	mg/kg			2.0E+01	mg/kg/day	8.4E-06	NA	NA	NA	NA	NA
				Cobalt	2.8E+00	mg/kg	1.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Iron	1.0E+04	mg/kg	4.8E-05	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Manganese	1.3E+02	mg/kg	6.4E-07	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Mercury	2.4E-01	mg/kg	1.1E-09	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Vanadium	1.9E+01	mg/kg	9.0E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
			Exp. Route Total								9.4E-06					NA
		Exposure Point Total									4.0E-05					NA
	Exposure Medium Total										4.0E-05					NA
Soil* Outside Waste Area											4.0E-05					NA
Soil*	Soil*	Soil Across Site	Ingestion													
				2,4-Dinitrotoluene	2.1E-01	mg/kg	8.8E-08	mg/kg/day	3.1E-01	mg/kg/day	2.7E-08	NA	NA	NA	NA	NA
				Benzo(a)anthracene[1]	7.0E-02	mg/kg			7.3E-01	mg/kg/day	1.1E-07	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	1.1E-01	mg/kg			7.3E+00	mg/kg/day	1.8E-06	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	9.0E-02	mg/kg			7.3E-01	mg/kg/day	1.4E-07	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	8.5E-02	mg/kg			7.3E-02	mg/kg/day	1.3E-08	NA	NA	NA	NA	NA
				Chrysene[1]	8.6E-02	mg/kg			7.3E-03	mg/kg/day	1.3E-09	NA	NA	NA	NA	NA
				Dibenz(a,h)anthracene[1]	4.5E-02	mg/kg			7.3E+00	mg/kg/day	7.1E-07	NA	NA	NA	NA	NA
				Indeno(1,2,3-cd)pyrene[1]	1.5E-01	mg/kg			7.3E-01	mg/kg/day	2.4E-07	NA	NA	NA	NA	NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	4.0E-08	mg/kg/day	7.0E+00	mg/kg/day	2.8E-07	NA	NA	NA	NA	NA
				alpha-BHC	3.9E-02	mg/kg	1.7E-08	mg/kg/day	6.3E+00	mg/kg/day	1.1E-07	NA	NA	NA	NA	NA
				Aroclor-1254	3.2E+00	mg/kg	1.4E-06	mg/kg/day	2.0E+00	mg/kg/day	2.7E-06	NA	NA	NA	NA	NA
				Aroclor-1260	2.2E-01	mg/kg	9.3E-08	mg/kg/day	2.0E+00	mg/kg/day	1.9E-07	NA	NA	NA	NA	NA
				Dieldrin	3.5E-03	mg/kg	1.5E-09	mg/kg/day	1.6E+01	mg/kg/day	2.4E-08	NA	NA	NA	NA	NA
				Heptachlor	1.7E-02	mg/kg	7.2E-09	mg/kg/day	4.5E+00	mg/kg/day	3.2E-08	NA	NA	NA	NA	NA
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	5.7E-07	mg/kg/day	3.0E-02	mg/kg/day	1.7E-08	NA	NA	NA	NA	NA
				Aluminum	2.6E+04	mg/kg	1.1E-02	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Antimony	6.9E-01	mg/kg	2.9E-07	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Arsenic	1.7E+01	mg/kg	7.0E-06	mg/kg/day	1.5E+00	mg/kg/day	1.1E-05	NA	NA	NA	NA	NA
				Cadmium	8.1E+01	mg/kg	3.5E-05	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Chromium[1]	1.7E+01	mg/kg			5.0E-01	mg/kg/day	1.9E-05	NA	NA	NA	NA	NA
				Cobalt	2.9E+00	mg/kg	1.2E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Copper	9.0E+02	mg/kg	3.8E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Iron	1.2E+04	mg/kg	4.9E-03	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Manganese	2.4E+02	mg/kg	1.0E-04	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Mercury	2.1E-01	mg/kg	8.8E-08	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
				Vanadium	1.9E+01	mg/kg	7.9E-06	mg/kg/day	NA		NA	NA	NA	NA	NA	NA
			Exp. Route Total								3.5E-05					NA

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil Across Site	Dermal Absorption	2,4-Dinitrotoluene	2.1E-01	mg/kg	9.9E-09	mg/kg/day	3.1E-01	mg/kg/day	3.1E-09	NA	NA	NA	NA	NA
				Benzo(a)anthracene[1]	7.0E-02	mg/kg			7.3E-01	mg/kg/day	2.0E-08	NA	NA	NA	NA	NA
				Benzo(a)pyrene[1]	1.1E-01	mg/kg			7.3E+00	mg/kg/day	3.3E-07	NA	NA	NA	NA	NA
				Benzo(b)fluoranthene[1]	9.0E-02	mg/kg			7.3E-01	mg/kg/day	2.6E-08	NA	NA	NA	NA	NA
				Benzo(k)fluoranthene[1]	8.5E-02	mg/kg			7.3E-02	mg/kg/day	2.5E-09	NA	NA	NA	NA	NA
				Chrysene[1]	8.6E-02	mg/kg			7.3E-03	mg/kg/day	2.5E-10	NA	NA	NA	NA	NA
				Dibenz(a,h)anthracene[1]	4.5E-02	mg/kg			7.3E+00	mg/kg/day	1.3E-07	NA	NA	NA	NA	NA
				Indeno(1,2,3-cd)pyrene[1]	1.5E-01	mg/kg			7.3E-01	mg/kg/day	4.4E-08	NA	NA	NA	NA	NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	4.4E-09	mg/kg/day	7.0E+00	mg/kg/day	3.1E-08	NA	NA	NA	NA	NA
				alpha-BHC	3.9E-02	mg/kg	1.9E-09	mg/kg/day	6.3E+00	mg/kg/day	1.2E-08	NA	NA	NA	NA	NA
				Aroclor-1254	3.2E+00	mg/kg	2.1E-07	mg/kg/day	2.0E+00	mg/kg/day	4.2E-07	NA	NA	NA	NA	NA
				Aroclor-1260	2.2E-01	mg/kg	1.5E-08	mg/kg/day	2.0E+00	mg/kg/day	2.9E-08	NA	NA	NA	NA	NA
				Dieldrin	3.5E-03	mg/kg	1.7E-10	mg/kg/day	1.6E+01	mg/kg/day	2.7E-09	NA	NA	NA	NA	NA
				Heptachlor	1.7E-02	mg/kg	8.1E-10	mg/kg/day	4.5E+00	mg/kg/day	3.6E-09	NA	NA	NA	NA	NA
				2,4,6-Trinitrotoluene	1.3E+00	mg/kg	2.0E-08	mg/kg/day	3.0E-02	mg/kg/day	6.1E-10	NA	NA	NA	NA	NA
				Aluminum	2.6E+04	mg/kg	1.2E-04	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Antimony	6.9E-01	mg/kg	3.3E-09	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Arsenic	1.7E+01	mg/kg	2.4E-07	mg/kg/day	1.5E+00	mg/kg/day	3.6E-07	NA	NA	NA	NA	NA
				Cadmium	8.1E+01	mg/kg	3.9E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Chromium[1]	1.7E+01	mg/kg			2.0E+01	mg/kg/day	1.1E-05	NA	NA	NA	NA	NA
				Cobalt	2.9E+00	mg/kg	1.4E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Copper	9.0E+02	mg/kg	4.3E-06	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Iron	1.2E+04	mg/kg	5.5E-05	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Manganese	2.4E+02	mg/kg	1.1E-06	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Mercury	2.1E-01	mg/kg	9.8E-10	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
				Vanadium	1.9E+01	mg/kg	8.8E-08	mg/kg/day	NA	mg/kg/day	NA	NA	NA	NA	NA	NA
			Exp. Route Total								1.2E-05					NA
		Exposure Point Total									4.8E-05					NA
	Exposure Medium Total										4.8E-05					NA
	Air	Emissions from Soil* Across Site	Inhalation	Chromium[1]	1.3E-08	mg/m^3			8.4E-02	(ug/m3)$^{-1}$	7.4E-07	NA	NA	NA	NA	NA
			Exp. Route Total								7.4E-07					NA
		Exposure Point Total									7.4E-07					NA
	Exposure Medium Total										7.4E-07					NA
Soil* Across Site											4.8E-05					NA

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Ingestion	Heptachlor epoxide	2.7E-02	ug/L	1.4E-07	mg/kg/day	9.1E+00	mg/kg/day	1.3E-06	NA	NA	NA	NA	NA
				RDX	1.8E+00	ug/L	9.5E-06	mg/kg/day	1.1E-01	mg/kg/day	1.0E-06	NA	NA	NA	NA	NA
			Exp. Route Total								2.4E-06					NA
			Dermal Absorption	Heptachlor epoxide	2.7E-02	ug/L	2.4E-08	mg/kg/day	9.1E+00	mg/kg/day	2.2E-07	NA	NA	NA	NA	NA
				RDX	1.8E+00	ug/L	6.0E-07	mg/kg/day	1.1E-01	mg/kg/day	6.6E-08	NA	NA	NA	NA	NA
			Exp. Route Total								2.8E-07					NA
		Exposure Point Total									2.6E-06					NA
	Exposure Medium Total										2.6E-06					NA
Shallow Aquifer Groundwater Total											2.6E-06					NA
Total of Receptor Risks Across All Media											5.6E-05	Total of Receptor Hazards Across All Media				NA

Notes-

NA = Not applicable.

Total is maximum of soil (in waste area, across site, outside waste area, or sludge area) and groundwater (shallow).

1. See Table 7.4.CTE Supplement A for calculation of intake and cancer risk following MMOA method.

TABLE 7.4.CTE Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

CENTRAL TENDENCY

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations								
							Intake				CSF/Unit Risk				Cancer Risk
					Value	Units	Value			Units	Value			Units	
							0-2 yrs	2-6 yrs	6-16 years		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)		
Soil*	Soil*	Soil in Waste Area	Ingestion	Benzo(a)anthracene	4.2E-02	mg/kg	5.1E-09	1.0E-08	2.7E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	6.6E-08
				Benzo(a)pyrene	4.0E-02	mg/kg	4.9E-09	9.8E-09	2.6E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	6.3E-07
				Benzo(b)fluoranthene	5.6E-02	mg/kg	6.8E-09	1.4E-08	3.7E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	8.8E-08
				Benzo(k)fluoranthene	4.6E-02	mg/kg	5.6E-09	1.1E-08	3.0E-09	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	mg/kg/day	7.2E-09
				Chrysene	5.0E-02	mg/kg	6.1E-09	1.2E-08	3.3E-09	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	mg/kg/day	7.8E-10
				Chromium	2.1E+01	mg/kg	2.6E-06	5.2E-06	1.4E-06	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	mg/kg/day	2.3E-05
			Dermal	Benzo(a)anthracene	4.2E-02	mg/kg	7.5E-10	1.5E-09	1.6E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	1.2E-08
				Benzo(a)pyrene	4.0E-02	mg/kg	7.1E-10	1.4E-09	1.6E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	1.2E-07
				Benzo(b)fluoranthene	5.6E-02	mg/kg	1.0E-09	2.0E-09	2.2E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	1.6E-08
				Benzo(k)fluoranthene	4.6E-02	mg/kg	8.2E-10	1.6E-09	1.8E-09	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	mg/kg/day	1.3E-09
				Chrysene	5.0E-02	mg/kg	8.9E-10	1.8E-09	1.9E-09	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	mg/kg/day	1.5E-10
				Chromium	2.1E+01	mg/kg	2.9E-08	5.8E-08	6.3E-08	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	mg/kg/day	1.3E-05
	Air	Emissions from Soil* in Waste Area	Inhalation	Chromium	1.6E-08	mg/m^3	2.9E-10	5.7E-10	1.4E-09	mg/m^3	8.4E-01	2.5E-01	2.5E-01	$1/ug/m^3$	7.4E-07
		Soil Outside Waste Area	Ingestion	Benzo(a)anthracene	7.2E-02	mg/kg	8.8E-09	1.8E-08	4.7E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	1.1E-07
				Benzo(a)pyrene	9.8E-02	mg/kg	1.2E-08	2.4E-08	6.4E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	1.5E-06
				Benzo(b)fluoranthene	9.6E-02	mg/kg	1.2E-08	2.4E-08	6.3E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	1.5E-07
				Benzo(k)fluoranthene	9.3E-02	mg/kg	1.1E-08	2.3E-08	6.1E-09	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	mg/kg/day	1.5E-08
				Chrysene	8.9E-02	mg/kg	1.1E-08	2.2E-08	5.8E-09	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	mg/kg/day	1.4E-09
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	5.5E-09	1.1E-08	2.9E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	7.1E-07
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	1.8E-08	3.7E-08	9.8E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	2.4E-07
				Chromium	1.4E+01	mg/kg	1.7E-06	3.3E-06	8.9E-07	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	mg/kg/day	1.5E-05
			Dermal	Benzo(a)anthracene	7.2E-02	mg/kg	1.3E-09	2.6E-09	2.8E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	2.1E-08
				Benzo(a)pyrene	9.8E-02	mg/kg	1.7E-09	3.5E-09	3.8E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	2.9E-07
				Benzo(b)fluoranthene	9.6E-02	mg/kg	1.7E-09	3.4E-09	3.7E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	2.8E-08
				Benzo(k)fluoranthene	9.3E-02	mg/kg	1.6E-09	3.3E-09	3.6E-09	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	mg/kg/day	2.7E-09
				Chrysene	8.9E-02	mg/kg	1.6E-09	3.2E-09	3.5E-09	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	mg/kg/day	2.6E-10
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	8.0E-10	1.6E-09	1.7E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	1.3E-07
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	2.7E-09	5.3E-09	5.8E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	4.4E-08
				Chromium	1.4E+01	mg/kg	1.9E-08	3.7E-08	4.1E-08	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	mg/kg/day	8.4E-06

TABLE 7.4.CTE Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

CENTRAL TENDENCY

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations								
							Intake				CSF/Unit Risk				Cancer Risk
					Value	Units	Value			Units	Value			Units	
							0-2 yrs	2-6 yrs	6-16 years		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)		
Soil*	Soil*	Soil Across Site	Ingestion	Benzo(a)anthracene	7.0E-02	mg/kg	8.5E-09	1.7E-08	4.6E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	1.1E-07
				Benzo(a)pyrene	1.1E-01	mg/kg	1.4E-08	2.8E-08	7.4E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	1.8E-06
				Benzo(b)fluoranthene	9.0E-02	mg/kg	1.1E-08	2.2E-08	5.9E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	1.4E-07
				Benzo(k)fluoranthene	8.5E-02	mg/kg	1.0E-08	2.1E-08	5.6E-09	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	mg/kg/day	1.3E-08
				Chrysene	8.6E-02	mg/kg	1.0E-08	2.1E-08	5.6E-09	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	mg/kg/day	1.3E-09
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	5.5E-09	1.1E-08	2.9E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	7.1E-07
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	1.8E-08	3.7E-08	9.8E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	2.4E-07
				Chromium	1.7E+01	mg/kg	2.1E-06	4.2E-06	1.1E-06	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	mg/kg/day	1.9E-05
			Dermal	Benzo(a)anthracene	7.0E-02	mg/kg	1.2E-09	2.5E-09	2.7E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	2.0E-08
				Benzo(a)pyrene	1.1E-01	mg/kg	2.0E-09	4.0E-09	4.4E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	3.3E-07
				Benzo(b)fluoranthene	9.0E-02	mg/kg	1.6E-09	3.2E-09	3.5E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	2.6E-08
				Benzo(k)fluoranthene	8.5E-02	mg/kg	1.5E-09	3.0E-09	3.3E-09	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	mg/kg/day	2.5E-09
				Chrysene	8.6E-02	mg/kg	1.5E-09	3.0E-09	3.3E-09	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	mg/kg/day	2.5E-10
				Dibenz(a,h)anthracene	4.5E-02	mg/kg	8.0E-10	1.6E-09	1.7E-09	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	mg/kg/day	1.3E-07
				Indeno(1,2,3-cd)pyrene	1.5E-01	mg/kg	2.7E-09	5.3E-09	5.8E-09	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	mg/kg/day	4.4E-08
				Chromium	1.7E+01	mg/kg	2.4E-08	4.7E-08	5.2E-08	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	mg/kg/day	1.1E-05
	Air	Emissions from Soil* Across Site	Inhalation	Chromium	1.3E-08	mg/m^3	2.3E-10	4.7E-10	1.2E-09	mg/m^3	8.4E-01	2.5E-01	2.5E-01	$1/ug/m^3$	6.1E-07

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	1.5E-08	mg/kg/day	3.1E-01	mg/kg/day	4.6E-09	1.0E-06	mg/kg/day	2.0E-03	mg/kg/day	5.2E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	3.0E-10	mg/kg/day	7.3E-01	mg/kg/day	2.2E-10	2.1E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	2.8E-10	mg/kg/day	7.3E+00	mg/kg/day	2.1E-09	2.0E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	3.9E-10	mg/kg/day	7.3E-01	mg/kg/day	2.9E-10	2.8E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	3.2E-10	mg/kg/day	7.3E-02	mg/kg/day	2.4E-11	2.3E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	3.5E-10	mg/kg/day	7.3E-03	mg/kg/day	2.6E-12	2.5E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	6.6E-10	mg/kg/day	7.0E+00	mg/kg/day	4.6E-09	4.6E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	2.2E-09	mg/kg/day	6.3E+00	mg/kg/day	1.4E-08	1.5E-07	mg/kg/day	8.0E-03	mg/kg/day	1.9E-05
				Aroclor-1254	1.2E+01	mg/kg	8.2E-08	mg/kg/day	2.0E+00	mg/kg/day	1.6E-07	5.7E-06	mg/kg/day	3.0E-05	mg/kg/day	1.9E-01
				Aroclor-1260	7.4E-01	mg/kg	5.2E-09	mg/kg/day	2.0E+00	mg/kg/day	1.0E-08	3.6E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	2.8E-10	mg/kg/day	1.6E+01	mg/kg/day	4.5E-09	2.0E-08	mg/kg/day	1.0E-04	mg/kg/day	2.0E-04
				Heptachlor	1.4E-01	mg/kg	9.9E-10	mg/kg/day	4.5E+00	mg/kg/day	4.5E-09	6.9E-08	mg/kg/day	1.0E-04	mg/kg/day	6.9E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	2.9E-08	mg/kg/day	3.0E-02	mg/kg/day	8.7E-10	2.0E-06	mg/kg/day	5.0E-04	mg/kg/day	4.0E-03
				Aluminum	9.0E+04	mg/kg	6.3E-04	mg/kg/day	NA		NA	4.4E-02	mg/kg/day	1.0E+00	mg/kg/day	4.4E-02
				Arsenic	2.9E+00	mg/kg	2.0E-08	mg/kg/day	1.5E+00	mg/kg/day	3.1E-08	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.8E-03
				Cadmium	5.0E+02	mg/kg	3.5E-06	mg/kg/day	NA		NA	2.5E-04	mg/kg/day	1.0E-03	mg/kg/day	2.5E-01
				Chromium	2.1E+01	mg/kg	1.5E-07	mg/kg/day	5.0E-01	mg/kg/day	7.5E-08	1.0E-05	mg/kg/day	2.0E-02	mg/kg/day	5.2E-04
				Cobalt	5.2E+00	mg/kg	3.6E-08	mg/kg/day	NA		NA	2.5E-06	mg/kg/day	3.0E-03	mg/kg/day	8.5E-04
				Copper	5.2E+03	mg/kg	3.6E-05	mg/kg/day	NA		NA	2.5E-03	mg/kg/day	1.0E-02	mg/kg/day	2.5E-01
				Iron	1.1E+04	mg/kg	7.5E-05	mg/kg/day	NA		NA	5.3E-03	mg/kg/day	7.0E-01	mg/kg/day	7.5E-03
				Manganese	7.5E+02	mg/kg	5.3E-06	mg/kg/day	NA		NA	3.7E-04	mg/kg/day	1.4E-01	mg/kg/day	2.6E-03
				Vanadium	3.4E+01	mg/kg	2.4E-07	mg/kg/day	NA		NA	1.7E-05	mg/kg/day	5.0E-03	mg/kg/day	3.3E-03
			Exp. Route Total								3.1E-07					7.6E-01
			Dermal Absorption	2,4-Dinitrotoluene	2.1E+00	mg/kg	1.5E-09	mg/kg/day	3.1E-01	mg/kg/day	4.5E-10	1.0E-07	mg/kg/day	2.0E-03	mg/kg/day	5.1E-05
				Benzo(a)anthracene	4.2E-02	mg/kg	3.8E-11	mg/kg/day	7.3E-01	mg/kg/day	2.8E-11	2.7E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	3.6E-11	mg/kg/day	7.3E+00	mg/kg/day	2.6E-10	2.5E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	5.1E-11	mg/kg/day	7.3E-01	mg/kg/day	3.7E-11	3.6E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	4.2E-11	mg/kg/day	7.3E-02	mg/kg/day	3.0E-12	2.9E-09	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	4.5E-11	mg/kg/day	7.3E-03	mg/kg/day	3.3E-13	3.2E-09	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	6.5E-11	mg/kg/day	7.0E+00	mg/kg/day	4.5E-10	4.5E-09	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	2.2E-10	mg/kg/day	6.3E+00	mg/kg/day	1.4E-09	1.5E-08	mg/kg/day	8.0E-03	mg/kg/day	1.9E-06
				Aroclor-1254	1.2E+01	mg/kg	1.1E-08	mg/kg/day	2.0E+00	mg/kg/day	2.3E-08	7.9E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Aroclor-1260	7.4E-01	mg/kg	7.2E-10	mg/kg/day	2.0E+00	mg/kg/day	1.4E-09	5.0E-08	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	2.8E-11	mg/kg/day	1.6E+01	mg/kg/day	4.4E-10	1.9E-09	mg/kg/day	1.0E-04	mg/kg/day	1.9E-05
				Heptachlor	1.4E-01	mg/kg	9.8E-11	mg/kg/day	4.5E+00	mg/kg/day	4.4E-10	6.9E-09	mg/kg/day	1.0E-04	mg/kg/day	6.9E-05
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	9.2E-10	mg/kg/day	3.0E-02	mg/kg/day	2.7E-11	6.4E-08	mg/kg/day	5.0E-04	mg/kg/day	1.3E-04
				Aluminum	9.0E+04	mg/kg	6.3E-06	mg/kg/day	NA		NA	4.4E-04	mg/kg/day	1.0E+00	mg/kg/day	4.4E-04
				Arsenic	2.9E+00	mg/kg	6.1E-10	mg/kg/day	1.5E+00	mg/kg/day	9.1E-10	4.2E-08	mg/kg/day	3.0E-04	mg/kg/day	1.4E-04
				Cadmium	5.0E+02	mg/kg	3.5E-09	mg/kg/day	NA		NA	2.5E-07	mg/kg/day	2.5E-05	mg/kg/day	9.8E-03

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Chromium	2.1E+01	mg/kg	1.5E-09	mg/kg/day	2.0E+01	mg/kg/day	3.0E-08	1.0E-07	mg/kg/day	5.0E-04	mg/kg/day	2.1E-04
				Cobalt	5.2E+00	mg/kg	3.6E-10	mg/kg/day	NA		NA	2.5E-08	mg/kg/day	3.0E-03	mg/kg/day	8.4E-06
				Copper	5.2E+03	mg/kg	3.6E-07	mg/kg/day	NA		NA	2.5E-05	mg/kg/day	1.0E-02	mg/kg/day	2.5E-03
				Iron	1.1E+04	mg/kg	7.5E-07	mg/kg/day	NA		NA	5.2E-05	mg/kg/day	7.0E-01	mg/kg/day	7.5E-05
				Manganese	7.5E+02	mg/kg	5.2E-08	mg/kg/day	NA		NA	3.6E-06	mg/kg/day	1.4E-01	mg/kg/day	2.6E-05
				Vanadium	3.4E+01	mg/kg	2.3E-09	mg/kg/day	NA		NA	1.6E-07	mg/kg/day	5.0E-03	mg/kg/day	3.3E-05
			Exp. Route Total								5.8E-08					1.6E-02
		Exposure Point Total									3.7E-07					7.8E-01
	Exposure Medium Total										3.7E-07					7.8E-01
Soil* In Waste Area											**3.7E-07**					7.8E-01
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Water in Excavation Pit	Dermal Absorption	Heptachlor epoxide	2.7E-02	ug/L	5.0E-09	mg/kg/day	9.1E+00	mg/kg/day	4.5E-08	3.5E-07	mg/kg/day	1.3E-05	mg/kg/day	2.7E-02
				RDX	1.8E+00	ug/L	1.8E-09	mg/kg/day	1.1E-01	mg/kg/day	2.0E-10	1.3E-07	mg/kg/day	5.0E-02	mg/kg/day	2.6E-06
			Exp. Route Total								4.6E-08					2.7E-02
		Exposure Point Total									4.6E-08					2.7E-02
	Exposure Medium Total										4.6E-08					2.7E-02
Shallow Aquifer Groundwater Total											**4.6E-08**					**2.7E-02**
Total of Receptor Risks Across All Media											4.2E-07	Total of Receptor Hazards Across All Media				8.1E-01

bold indicates soil area with greatest risk or hazard index

Notes-

NA = Not applicable.

Total is maximum of soil (in waste area) and groundwater (shallow).

DA_{event} for dermal exposure to groundwater calculated on Table 7.7.RME Supplement A

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil in Waste Area	Ingestion													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	1.2E-07	mg/kg/day	3.1E-01	mg/kg/day	3.6E-08	9.0E-07	mg/kg/day	2.0E-03	mg/kg/day	4.5E-04
				Benzo(a)anthracene	4.2E-02	mg/kg	2.3E-09	mg/kg/day	7.3E-01	mg/kg/day	1.7E-09	1.8E-08	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	2.2E-09	mg/kg/day	7.3E+00	mg/kg/day	1.6E-08	1.7E-08	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	3.1E-09	mg/kg/day	7.3E-01	mg/kg/day	2.3E-09	2.4E-08	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	2.5E-09	mg/kg/day	7.3E-02	mg/kg/day	1.9E-10	2.0E-08	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	2.8E-09	mg/kg/day	7.3E-03	mg/kg/day	2.0E-11	2.1E-08	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	5.1E-09	mg/kg/day	7.0E+00	mg/kg/day	3.6E-08	4.0E-08	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	1.7E-08	mg/kg/day	6.3E+00	mg/kg/day	1.1E-07	1.3E-07	mg/kg/day	8.0E-03	mg/kg/day	1.7E-05
				Aroclor-1254	1.2E+01	mg/kg	6.4E-07	mg/kg/day	2.0E+00	mg/kg/day	1.3E-06	5.0E-06	mg/kg/day	2.0E-05	mg/kg/day	2.5E-01
				Aroclor-1260	7.4E-01	mg/kg	4.1E-08	mg/kg/day	2.0E+00	mg/kg/day	8.1E-08	3.2E-07	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	2.2E-09	mg/kg/day	1.6E+01	mg/kg/day	3.5E-08	1.7E-08	mg/kg/day	5.0E-05	mg/kg/day	3.4E-04
				Heptachlor	1.4E-01	mg/kg	7.7E-09	mg/kg/day	4.5E+00	mg/kg/day	3.5E-08	6.0E-08	mg/kg/day	5.0E-04	mg/kg/day	1.2E-04
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	2.3E-07	mg/kg/day	3.0E-02	mg/kg/day	6.8E-09	1.8E-06	mg/kg/day	5.0E-04	mg/kg/day	3.5E-03
				Aluminum	9.0E+04	mg/kg	4.9E-03	mg/kg/day	NA		NA	3.8E-02	mg/kg/day	1.0E+00	mg/kg/day	3.8E-02
				Arsenic	2.9E+00	mg/kg	1.6E-07	mg/kg/day	1.5E+00	mg/kg/day	2.4E-07	1.2E-06	mg/kg/day	3.0E-04	mg/kg/day	4.1E-03
				Cadmium	5.0E+02	mg/kg	2.8E-05	mg/kg/day	NA		NA	2.2E-04	mg/kg/day	1.0E-03	mg/kg/day	2.2E-01
				Chromium	2.1E+01	mg/kg	1.2E-06	mg/kg/day	5.0E-01	mg/kg/day	5.8E-07	9.1E-06	mg/kg/day	3.0E-03	mg/kg/day	3.0E-03
				Cobalt	5.2E+00	mg/kg	2.8E-07	mg/kg/day	NA		NA	2.2E-06	mg/kg/day	3.0E-04	mg/kg/day	7.4E-03
				Copper	5.2E+03	mg/kg	2.8E-04	mg/kg/day	NA		NA	2.2E-03	mg/kg/day	4.0E-02	mg/kg/day	5.5E-02
				Iron	1.1E+04	mg/kg	5.9E-04	mg/kg/day	NA		NA	4.6E-03	mg/kg/day	7.0E-01	mg/kg/day	6.6E-03
				Manganese	7.5E+02	mg/kg	4.1E-05	mg/kg/day	NA		NA	3.2E-04	mg/kg/day	1.4E-01	mg/kg/day	2.3E-03
				Vanadium	3.4E+01	mg/kg	1.9E-06	mg/kg/day	NA		NA	1.4E-05	mg/kg/day	5.0E-03	mg/kg/day	2.9E-03
			Exp. Route Total								2.5E-06					5.9E-01
			Dermal Absorption													
				2,4-Dinitrotoluene	2.1E+00	mg/kg	1.5E-08	mg/kg/day	3.1E-01	mg/kg/day	4.7E-09	1.2E-07	mg/kg/day	2.0E-03	mg/kg/day	5.9E-05
				Benzo(a)anthracene	4.2E-02	mg/kg	4.0E-10	mg/kg/day	7.3E-01	mg/kg/day	2.9E-10	3.1E-09	mg/kg/day	NA		NA
				Benzo(a)pyrene	4.0E-02	mg/kg	3.8E-10	mg/kg/day	7.3E+00	mg/kg/day	2.8E-09	2.9E-09	mg/kg/day	NA		NA
				Benzo(b)fluoranthene	5.6E-02	mg/kg	5.3E-10	mg/kg/day	7.3E-01	mg/kg/day	3.9E-10	4.1E-09	mg/kg/day	NA		NA
				Benzo(k)fluoranthene	4.6E-02	mg/kg	4.3E-10	mg/kg/day	7.3E-02	mg/kg/day	3.2E-11	3.4E-09	mg/kg/day	NA		NA
				Chrysene	5.0E-02	mg/kg	4.7E-10	mg/kg/day	7.3E-03	mg/kg/day	3.5E-12	3.7E-09	mg/kg/day	NA		NA
				n-Nitroso-di-n-propylamine	9.3E-02	mg/kg	6.8E-10	mg/kg/day	7.0E+00	mg/kg/day	4.7E-09	5.3E-09	mg/kg/day	NA		NA
				alpha-BHC	3.1E-01	mg/kg	2.2E-09	mg/kg/day	6.3E+00	mg/kg/day	1.4E-08	1.7E-08	mg/kg/day	8.0E-03	mg/kg/day	2.2E-06
				Aroclor-1254	1.2E+01	mg/kg	1.2E-07	mg/kg/day	2.0E+00	mg/kg/day	2.4E-07	9.2E-07	mg/kg/day	2.0E-05	mg/kg/day	4.6E-02
				Aroclor-1260	7.4E-01	mg/kg	7.5E-09	mg/kg/day	2.0E+00	mg/kg/day	1.5E-08	5.8E-08	mg/kg/day	NA		NA
				Dieldrin	4.0E-02	mg/kg	2.9E-10	mg/kg/day	1.6E+01	mg/kg/day	4.6E-09	2.3E-09	mg/kg/day	5.0E-05	mg/kg/day	4.5E-05
				Heptachlor	1.4E-01	mg/kg	1.0E-09	mg/kg/day	4.5E+00	mg/kg/day	4.6E-09	7.9E-09	mg/kg/day	5.0E-04	mg/kg/day	1.6E-05
				2,4,6-Trinitrotoluene	4.1E+00	mg/kg	9.5E-09	mg/kg/day	3.0E-02	mg/kg/day	2.9E-10	7.4E-08	mg/kg/day	5.0E-04	mg/kg/day	1.5E-04
				Aluminum	9.0E+04	mg/kg	6.5E-05	mg/kg/day	NA		NA	5.1E-04	mg/kg/day	1.0E+00	mg/kg/day	5.1E-04
				Arsenic	2.9E+00	mg/kg	6.3E-09	mg/kg/day	1.5E+00	mg/kg/day	9.5E-09	4.9E-08	mg/kg/day	3.0E-04	mg/kg/day	1.6E-04
				Cadmium	5.0E+02	mg/kg	3.7E-08	mg/kg/day	NA		NA	2.8E-07	mg/kg/day	2.5E-05	mg/kg/day	1.1E-02
				Chromium	2.1E+01	mg/kg	1.5E-08	mg/kg/day	2.0E+01	mg/kg/day	3.1E-07	1.2E-07	mg/kg/day	7.5E-05	mg/kg/day	1.6E-03
				Cobalt	5.2E+00	mg/kg	3.8E-09	mg/kg/day	NA		NA	2.9E-08	mg/kg/day	3.0E-04	mg/kg/day	9.7E-05

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Site 24

NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (continued)	Soil*	Soil in Waste Area	Dermal Absorption	Copper	5.2E+03	mg/kg	3.8E-06	mg/kg/day	NA		NA	2.9E-05	mg/kg/day	4.0E-02	mg/kg/day	7.3E-04
				Iron	1.1E+04	mg/kg	7.8E-06	mg/kg/day	NA		NA	6.1E-05	mg/kg/day	7.0E-01	mg/kg/day	8.7E-05
				Manganese	7.5E+02	mg/kg	5.4E-07	mg/kg/day	NA		NA	4.2E-06	mg/kg/day	1.4E-01	mg/kg/day	3.0E-05
				Vanadium	3.4E+01	mg/kg	2.4E-08	mg/kg/day	NA		NA	1.9E-07	mg/kg/day	5.0E-03	mg/kg/day	3.8E-05
			Exp. Route Total								6.1E-07					6.1E-02
		Exposure Point Total									3.1E-06					6.5E-01
	Exposure Medium Total										3.1E-06					6.5E-01
Soil* In Waste Area											**3.1E-06**					**6.5E-01**
										Total of Receptor Risks Across All Media	3.1E-06				Total of Receptor Hazards Across All Media	6.5E-01

bold indicates aquifer with greatest risk or hazard index

Notes-

NA = Not applicable.

Total is maximum of soil (in waste area) and groundwater (shallow).

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil in Waste Area	Benzo(a)pyrene	2.0E-08	NA	1.1E-08	3.1E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	1.9E-09	NA	1.0E-09	2.9E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	1.5E-10	NA	7.7E-11	2.2E-10	NA	NA	NA	NA	NA
			Aroclor-1254	8.2E-08	NA	4.6E-08	1.3E-07	Ocular, Finger and Toe Nails	6.0E-03	NA	3.4E-03	9.4E-03
			Aluminum	NA	NA	NA	NA	Neurological	1.9E-03	NA	7.4E-05	1.9E-03
			Arsenic	3.4E-07	NA	4.0E-08	3.8E-07	Skin, Vascular	2.2E-03	NA	2.6E-04	2.4E-03
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	1.6E-01	NA	2.6E-02	1.9E-01
			Chromium	4.6E-07	NA	7.4E-07	1.2E-06	Not identified	9.0E-04	NA	1.4E-03	2.3E-03
			Cobalt	NA	NA	NA	NA	Thyroid	2.3E-03	NA	9.3E-05	2.4E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	2.2E-03	NA	8.6E-05	2.3E-03
			Chemical Total	9.0E-07	NA	8.3E-07	1.7E-06		1.8E-01	NA	3.1E-02	2.1E-01
		Exposure Point Total					1.7E-06					2.1E-01
	Exposure Medium Total						1.7E-06					2.1E-01
	Air	Emissions from Surface Soil in Waste Area	Chromium	NA	6.7E-09	NA	6.7E-09	Respiratory System	NA	2.3E-06	NA	2.3E-06
			Chemical Total	NA	6.7E-09	NA	6.7E-09		NA	2.3E-06	NA	2.3E-06
		Exposure Point Total					6.7E-09					2.3E-06
	Exposure Medium Total						6.7E-09					2.3E-06
Surface Soil In Waste Area							1.7E-06					2.1E-01
Surface Soil	Surface Soil	Surface Soil Across Site	Benzo(a)anthracene	4.0E-09	NA	2.1E-09	6.1E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	4.6E-08	NA	2.4E-08	6.9E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	4.6E-09	NA	2.4E-09	7.0E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	4.5E-10	NA	2.4E-10	6.9E-10	NA	NA	NA	NA	NA
			Chrysene	1.3E-10	NA	6.9E-11	2.0E-10	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	2.3E-08	NA	1.2E-08	3.5E-08	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	7.6E-09	NA	4.0E-09	1.2E-08	NA	NA	NA	NA	NA
			Aroclor-1254	8.2E-08	NA	4.6E-08	1.3E-07	Ocular, Finger and Toe Nails	6.0E-03	NA	3.4E-03	9.4E-03
			Aluminum	NA	NA	NA	NA	Neurological	1.4E-03	NA	5.6E-05	1.5E-03
			Arsenic	2.2E-06	NA	2.6E-07	2.4E-06	Skin, Vascular	1.4E-02	NA	1.7E-03	1.6E-02
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	2.3E-02	NA	3.7E-03	2.7E-02
			Chromium	3.7E-07	NA	5.8E-07	9.5E-07	Not identified	7.1E-04	NA	1.1E-03	1.8E-03

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (continued)	Surface Soil	Surface Soil Across Site	Cobalt	NA	NA	NA	NA	Thyroid	1.7E-03	NA	6.9E-05	1.8E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	1.9E-03	NA	7.7E-05	2.0E-03
			Manganese	NA	NA	NA	NA	CNS	1.5E-04	NA	5.9E-06	1.5E-04
			Mercury	NA	NA	NA	NA	Developmental, Neurological	1.2E-03	NA	4.8E-05	1.3E-03
			Chemical Total	2.7E-06	NA	9.3E-07	3.6E-06		5.0E-02	NA	1.0E-02	6.1E-02
		Exposure Point Total					3.6E-06					6.1E-02
	Exposure Medium Total						3.6E-06					6.1E-02
	Air	Emissions from Surface Soil Across Site	Chromium	NA	5.3E-09	NA	5.3E-09	Respiratory System	NA	1.8E-06	NA	1.8E-06
			Chemical Total	NA	5.3E-09	NA	5.3E-09		NA	1.8E-06	NA	1.8E-06
		Exposure Point Total					5.3E-09					1.8E-06
	Exposure Medium Total						5.3E-09					1.8E-06
Surface Soil Across Site							3.6E-06					6.1E-02
Surface Soil	Surface Soil	Surface Soil Outside Waste Area	Benzo(a)anthracene	4.0E-09	NA	2.1E-09	6.1E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	4.8E-08	NA	2.5E-08	7.2E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	4.9E-09	NA	2.5E-09	7.4E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	4.8E-10	NA	2.5E-10	7.3E-10	NA	NA	NA	NA	NA
			Chrysene	4.6E-11	NA	2.4E-11	7.1E-11	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	2.3E-08	NA	1.2E-08	3.5E-08	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	7.6E-09	NA	4.0E-09	1.2E-08	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	1.4E-03	NA	5.5E-05	1.4E-03
			Arsenic	2.6E-06	NA	3.1E-07	2.9E-06	Skin, Vascular	1.7E-02	NA	2.0E-03	1.9E-02
			Chromium	3.6E-07	NA	5.8E-07	9.4E-07	Not identified	7.1E-04	NA	1.1E-03	1.8E-03
			Cobalt	NA	NA	NA	NA	Thyroid	1.7E-03	NA	6.9E-05	1.8E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	2.0E-03	NA	7.9E-05	2.1E-03
			Manganese	NA	NA	NA	NA	CNS	2.7E-04	NA	1.1E-05	2.9E-04
			Mercury	NA	NA	NA	NA	Developmental, Neurological	1.4E-03	NA	5.4E-05	1.4E-03
			Chemical Total	3.0E-06	NA	9.3E-07	4.0E-06		2.4E-02	NA	3.4E-03	2.8E-02
		Exposure Point Total					4.0E-06					2.8E-02
	Exposure Medium Total						4.0E-06					2.8E-02

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
	Air	Emissions from Surface Soil Outside Waste Area	Chromium	NA	5.2E-09	NA	5.2E-09	Respiratory System	NA	1.8E-06	NA	1.8E-06
			Chemical Total	NA	5.2E-09	NA	5.2E-09		NA	1.8E-06	NA	1.8E-06
		Exposure Point Total					5.2E-09					1.8E-06
	Exposure Medium Total						5.2E-09					1.8E-06
Surface Soil Outside Waste Area							4.0E-06					2.8E-02
Soil*	Soil*	Soil* in Sludge Area	Chromium	2.4E-07	NA	3.8E-07	6.2E-07	Not identified	4.7E-04	NA	7.5E-04	1.2E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	5.9E-03	NA	2.4E-04	6.1E-03
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	1.7E-03	NA	6.8E-05	1.8E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	3.6E-04	NA	1.4E-05	3.7E-04
			Chemical Total	2.4E-07	NA	3.8E-07	6.2E-07		8.4E-03	NA	1.1E-03	9.5E-03
		Exposure Point Total					6.2E-07					9.5E-03
	Exposure Medium Total						6.2E-07					9.5E-03
Soil* in Sludge Area							6.2E-07					9.5E-03
Receptor Total - Surface Soil In Waste Area							1.7E-06	Receptor Total - Surface Soil In Waste Area				2.1E-01
Receptor Total - Surface Soil Across Site							3.6E-06	Receptor Total - Surface Soil Across Site				6.1E-02
Receptor Total - Surface Soil Outside Waste Area							4.0E-06	Receptor Total - Surface Soil Outside Waste Area				2.8E-02
Receptor Total - Soil* in Sludge Area							6.2E-07	Receptor Total - Soil* in Sludge Area				9.5E-03

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

Surface Soil in Waste Area	
Total Ocular HI Across All Media =	9.4E-03
Total Finger and Toe Nails HI Across All Media =	9.4E-03
Total Neurological/Central Nervous System HI Across All Media =	1.9E-03
Total Skin HI Across All Media =	2.4E-03
Total Vascular HI Across All Media =	2.4E-03
Total Kidney HI Across All Media =	1.9E-01
Total Thyroid HI Across All Media =	2.4E-03
Total Gastrointestinal HI Across All Media =	2.3E-03
Total Respiratory System HI Across All Media =	2.3E-06

Surface Soil in Across Site	
Total Ocular HI Across All Media =	9.4E-03
Total Finger and Toe Nails HI Across All Media =	9.4E-03
Total Neurological/Central Nervous System HI Across All Media =	2.9E-03
Total Skin HI Across All Media =	1.6E-02
Total Vascular HI Across All Media =	1.6E-02
Total Kidney HI Across All Media =	2.7E-02
Total Thyroid HI Across All Media =	1.8E-03
Total Gastrointestinal HI Across All Media =	2.0E-03
Total Respiratory System HI Across All Media =	1.8E-06
Total Developmental HI Across All Media =	1.3E-03

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Surface Soil Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	3.1E-03
Total Skin HI Across All Media =	1.9E-02
Total Vascular HI Across All Media =	1.9E-02
Total Thyroid HI Across All Media =	1.8E-03
Total Gastrointestinal HI Across All Media =	2.1E-03
Total Developmental HI Across All Media =	1.4E-03
Total Respiratory System HI Across All Media =	1.8E-06

Soil* in Sludge Area

Total Neurological/Central Nervous System HI Across All Media =	3.7E-04
Total Thyroid HI Across All Media =	6.1E-03
Total Gastrointestinal HI Across All Media =	1.8E-03

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil in Waste Area	Benzo(a)pyrene	1.0E-08	NA	1.6E-08	2.6E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	1.0E-09	NA	1.5E-09	2.5E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	7.6E-11	NA	1.1E-10	1.9E-10	NA	NA	NA	NA	NA
			Aroclor-1254	4.2E-08	NA	6.8E-08	1.1E-07	Ocular, Finger and Toe Nails	8.2E-03	NA	1.3E-02	2.1E-02
			Aluminum	NA	NA	NA	NA	Neurological	2.5E-03	NA	2.9E-04	2.8E-03
			Arsenic	1.7E-07	NA	5.9E-08	2.3E-07	Skin, Vascular	3.0E-03	NA	1.0E-03	4.0E-03
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	2.2E-01	NA	1.0E-01	3.2E-01
			Chromium	2.4E-07	NA	1.1E-06	1.3E-06	Not identified	1.2E-03	NA	5.6E-03	6.8E-03
			Cobalt	NA	NA	NA	NA	Thyroid	3.2E-03	NA	3.7E-04	3.6E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	3.0E-03	NA	3.4E-04	3.3E-03
			Chemical Total	4.6E-07	NA	1.2E-06	1.7E-06		2.4E-01	NA	1.2E-01	3.6E-01
		Exposure Point Total					1.7E-06					3.6E-01
	Exposure Medium Total						1.7E-06					3.6E-01
	Air	Emissions from Surface Soil in Waste Area	Chromium	NA	2.5E-09	NA	2.5E-09	Respiratory System	NA	2.3E-06	NA	2.3E-06
			Chemical Total	NA	2.5E-09	NA	2.5E-09		NA	2.3E-06	NA	2.3E-06
		Exposure Point Total					2.5E-09					2.3E-06
	Exposure Medium Total						2.5E-09					2.3E-06
Surface Soil In Waste Area							1.7E-06					3.6E-01
Surface Soil	Surface Soil	Surface Soil Across Site	Benzo(a)anthracene	2.1E-09	NA	3.0E-09	5.1E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2.3E-08	NA	3.5E-08	5.8E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2.4E-09	NA	3.5E-09	5.9E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2.3E-10	NA	3.5E-10	5.8E-10	NA	NA	NA	NA	NA
			Chrysene	6.8E-11	NA	1.0E-10	1.7E-10	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	1.2E-08	NA	1.7E-08	2.9E-08	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	3.9E-09	NA	5.8E-09	9.8E-09	NA	NA	NA	NA	NA
			Aroclor-1254	4.2E-08	NA	6.8E-08	1.1E-07	Ocular, Finger and Toe Nails	8.2E-03	NA	1.3E-02	2.1E-02
			Aluminum	NA	NA	NA	NA	Neurological	1.9E-03	NA	2.2E-04	2.2E-03
			Arsenic	1.1E-06	NA	3.8E-07	1.5E-06	Skin, Vascular	1.9E-02	NA	6.6E-03	2.6E-02
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	3.2E-02	NA	1.5E-02	4.7E-02
			Chromium	1.9E-07	NA	8.6E-07	1.0E-06	Not identified	9.8E-04	NA	4.5E-03	5.4E-03

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (continued)	Surface Soil	Surface Soil Across Site	Cobalt	NA	NA	NA	NA	Thyroid	2.4E-03	NA	2.7E-04	2.7E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	2.7E-03	NA	3.0E-04	3.0E-03
			Manganese	NA	NA	NA	NA	CNS	2.0E-04	NA	2.3E-05	2.3E-04
			Mercury	NA	NA	NA	NA	Developmental, Neurological	1.7E-03	NA	1.9E-04	1.8E-03
			Chemical Total	1.4E-06	NA	1.4E-06	2.8E-06		6.9E-02	NA	4.0E-02	1.1E-01
		Exposure Point Total					2.8E-06					1.1E-01
	Exposure Medium Total						2.8E-06					1.1E-01
	Air	Emissions from Surface Soil Across Site	Chromium	NA	2.0E-09	NA	2.0E-09	Respiratory System	NA	1.8E-06	NA	1.8E-06
			Chemical Total	NA	2.0E-09	NA	2.0E-09		NA	1.8E-06	NA	1.8E-06
		Exposure Point Total					2.0E-09					1.8E-06
	Exposure Medium Total						2.0E-09					1.8E-06
Surface Soil Across Site							2.8E-06					1.1E-01
Surface Soil	Surface Soil	Surface Soil Outside Waste Area	Benzo(a)anthracene	2.1E-09	NA	3.0E-09	5.1E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2.5E-08	NA	3.6E-08	6.1E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2.5E-09	NA	3.7E-09	6.2E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2.5E-10	NA	3.7E-10	6.1E-10	NA	NA	NA	NA	NA
			Chrysene	2.4E-11	NA	3.5E-11	5.9E-11	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	1.2E-08	NA	1.7E-08	2.9E-08	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	3.9E-09	NA	5.8E-09	9.8E-09	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	1.9E-03	NA	2.1E-04	2.1E-03
			Arsenic	1.3E-06	NA	4.5E-07	1.8E-06	Skin, Vascular	2.3E-02	NA	7.8E-03	3.1E-02
			Chromium	1.9E-07	NA	8.5E-07	1.0E-06	Not identified	9.7E-04	NA	4.4E-03	5.4E-03
			Cobalt	NA	NA	NA	NA	Thyroid	2.4E-03	NA	2.7E-04	2.7E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	2.7E-03	NA	3.1E-04	3.0E-03
			Manganese	NA	NA	NA	NA	CNS	3.8E-04	NA	4.3E-05	4.2E-04
			Mercury	NA	NA	NA	NA	Developmental, Neurological	1.9E-03	NA	2.1E-04	2.1E-03
			Chemical Total	1.6E-06	NA	1.4E-06	2.9E-06		3.3E-02	NA	1.3E-02	4.6E-02
		Exposure Point Total					2.9E-06					4.6E-02
	Exposure Medium Total						2.9E-06					4.6E-02

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (continued)	Air	Emissions from Surface Soil Outside Waste Area	Chromium	NA	2.0E-09	NA	2.0E-09	Respiratory System	NA	1.8E-06	NA	1.8E-06
			Chemical Total	NA	2.0E-09	NA	2.0E-09		NA	1.8E-06	NA	1.8E-06
		Exposure Point Total					2.0E-09					1.8E-06
	Exposure Medium Total						2.0E-09					1.8E-06
Surface Soil Outside Waste Area							2.9E-06					4.6E-02
Soil*	Soil*	Soil* in Sludge Area	Chromium	1.2E-07	NA	5.7E-07	6.9E-07	Not identified	6.4E-04	NA	2.9E-03	3.6E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	8.1E-03	NA	9.2E-04	9.0E-03
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	2.3E-03	NA	2.6E-04	2.6E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	4.9E-04	NA	5.6E-05	5.4E-04
			Chemical Total	1.2E-07	NA	5.7E-07	6.9E-07		1.2E-02	NA	4.2E-03	1.6E-02
		Exposure Point Total					6.9E-07					1.6E-02
	Exposure Medium Total						6.9E-07					1.6E-02
Soil* in Sludge Area							6.9E-07					1.6E-02
Receptor Total - Surface Soil In Waste Area							1.7E-06	Receptor Total - Surface Soil In Waste Area				3.6E-01
Receptor Total - Surface Soil Across Site							2.8E-06	Receptor Total - Surface Soil Across Site				1.1E-01
Receptor Total - Surface Soil Outside Waste Area							2.9E-06	Receptor Total - Surface Soil Outside Waste Area				4.6E-02
Receptor Total - Soil* in Sludge Area							6.9E-07	Receptor Total - Soil* in Sludge Area				1.6E-02

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

Surface Soil in Waste Area		**Surface Soil in Across Site**	
Total Ocular HI Across All Media =	2.1E-02	Total Ocular HI Across All Media =	2.1E-02
Total Finger and Toe Nails HI Across All Media =	2.1E-02	Total Finger and Toe Nails HI Across All Media =	2.1E-02
Total Neurological/Central Nervous System HI Across All Media =	2.8E-03	Total Neurological/Central Nervous System HI Across All Media =	4.2E-03
Total Skin HI Across All Media =	4.0E-03	Total Skin HI Across All Media =	2.6E-02
Total Vascular HI Across All Media =	4.0E-03	Total Vascular HI Across All Media =	2.6E-02
Total Kidney HI Across All Media =	3.2E-01	Total Kidney HI Across All Media =	4.7E-02
Total Thyroid HI Across All Media =	3.6E-03	Total Thyroid HI Across All Media =	2.7E-03
Total Gastrointestinal HI Across All Media =	3.3E-03	Total Gastrointestinal HI Across All Media =	3.0E-03
Total Respiratory System HI Across All Media =	2.3E-06	Total Respiratory System HI Across All Media =	1.8E-06
		Total Developmental HI Across All Media =	1.8E-03

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Surface Soil Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	4.6E-03
Total Skin HI Across All Media =	3.1E-02
Total Vascular HI Across All Media =	3.1E-02
Total Thyroid HI Across All Media =	2.7E-03
Total Gastrointestinal HI Across All Media =	3.0E-03
Total Developmental HI Across All Media =	2.1E-03
Total Respiratory System HI Across All Media =	1.8E-06

Soil* in Sludge Area

Total Neurological/Central Nervous System HI Across All Media =	5.4E-04
Total Thyroid HI Across All Media =	9.0E-03
Total Gastrointestinal HI Across All Media =	2.6E-03

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil in Waste Area	Benzo(a)pyrene	1.0E-07	NA	8.8E-08	1.9E-07	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	9.7E-09	NA	8.3E-09	1.8E-08	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	7.4E-10	NA	6.3E-10	1.4E-09	NA	NA	NA	NA	NA
			Aroclor-1254	4.1E-07	NA	3.8E-07	7.9E-07	Ocular, Finger and Toe Nails	2.9E-02	NA	2.7E-02	5.6E-02
			Aluminum	NA	NA	NA	NA	Neurological	8.9E-03	NA	5.9E-04	9.5E-03
			Arsenic	1.7E-06	NA	3.3E-07	2.0E-06	Skin, Vascular	1.0E-02	NA	2.1E-03	1.3E-02
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	7.7E-01	NA	2.0E-01	9.7E-01
			Chromium	2.3E-06	NA	6.1E-06	8.4E-06	Not identified	4.3E-03	NA	1.1E-02	1.6E-02
			Cobalt	NA	NA	NA	NA	Thyroid	1.1E-02	NA	7.4E-04	1.2E-02
			Iron	NA	NA	NA	NA	Gastrointestinal	1.0E-02	NA	6.9E-04	1.1E-02
			Chemical Total	4.5E-06	NA	6.9E-06	1.1E-05		8.4E-01	NA	2.5E-01	1.1E+00
		Exposure Point Total					1.1E-05					1.1E+00
	Exposure Medium Total						1.1E-05					1.1E+00
	Air	Emissions from Surface Soil in Waste Area	Chromium	NA	6.7E-08	NA	6.7E-08	Respiratory System	NA	2.2E-05	NA	2.2E-05
			Chemical Total	NA	6.7E-08	NA	6.7E-08		NA	2.2E-05	NA	2.2E-05
		Exposure Point Total					6.7E-08					2.2E-05
	Exposure Medium Total						6.7E-08					2.2E-05
Surface Soil In Waste Area							1.1E-05					1.1E+00
Surface Soil	Surface Soil	Surface Soil Across Site	Benzo(a)anthracene	2.0E-08	NA	1.7E-08	3.7E-08	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2.3E-07	NA	2.0E-07	4.2E-07	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2.3E-08	NA	2.0E-08	4.3E-08	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2.3E-09	NA	2.0E-09	4.2E-09	NA	NA	NA	NA	NA
			Chrysene	6.6E-10	NA	5.7E-10	1.2E-09	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	1.1E-07	NA	9.8E-08	2.1E-07	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	3.8E-08	NA	3.3E-08	7.1E-08	NA	NA	NA	NA	NA
			Aroclor-1254	4.1E-07	NA	3.8E-07	7.9E-07	Ocular, Finger and Toe Nails	2.9E-02	NA	2.7E-02	5.6E-02
			Aluminum	NA	NA	NA	NA	Neurological	6.8E-03	NA	4.5E-04	7.2E-03
			Arsenic	1.1E-05	NA	2.1E-06	1.3E-05	Skin, Vascular	6.7E-02	NA	1.3E-02	8.1E-02
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	1.1E-01	NA	3.0E-02	1.4E-01
			Chromium	1.8E-06	NA	4.8E-06	6.7E-06	Not identified	3.4E-03	NA	9.0E-03	1.2E-02

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (continued)	Surface Soil	Surface Soil Across Site	Cobalt	NA	NA	NA	NA	Thyroid	8.4E-03	NA	5.5E-04	8.9E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	9.3E-03	NA	6.1E-04	9.9E-03
			Manganese	NA	NA	NA	NA	CNS	7.2E-04	NA	4.7E-05	7.6E-04
			Mercury	NA	NA	NA	NA	Developmental, Neurological	5.8E-03	NA	3.8E-04	6.2E-03
			Chemical Total	1.3E-05	NA	7.7E-06	2.1E-05		2.4E-01	NA	8.1E-02	3.2E-01
		Exposure Point Total					2.1E-05					3.2E-01
	Exposure Medium Total						2.1E-05					3.2E-01
	Air	Emissions from Surface Soil Across Site	Chromium	NA	5.3E-08	NA	5.3E-08	Respiratory System	NA	1.8E-05	NA	1.8E-05
			Chemical Total	NA	5.3E-08	NA	5.3E-08		NA	1.8E-05	NA	1.8E-05
		Exposure Point Total					5.3E-08					1.8E-05
	Exposure Medium Total						5.3E-08					1.8E-05
Surface Soil Across Site							2.1E-05					3.2E-01
Surface Soil	Surface Soil	Surface Soil Outside Waste Area	Benzo(a)anthracene	2E-08	NA	2E-08	4E-08	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2E-07	NA	2E-07	4E-07	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2E-08	NA	2E-08	5E-08	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2E-09	NA	2E-09	4E-09	NA	NA	NA	NA	NA
			Chrysene	2E-10	NA	2E-10	4E-10	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	1E-07	NA	1E-07	2E-07	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	4E-08	NA	3E-08	7E-08	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	6.6E-03	NA	4.3E-04	7.0E-03
			Arsenic	1E-05	NA	3E-06	2E-05	Skin, Vascular	8.0E-02	NA	1.6E-02	9.6E-02
			Chromium	2E-06	NA	5E-06	7E-06	Not identified	3.4E-03	NA	9.0E-03	1.2E-02
			Cobalt	NA	NA	NA	NA	Thyroid	8.3E-03	NA	5.5E-04	8.9E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	9.5E-03	NA	6.3E-04	1.0E-02
			Manganese	NA	NA	NA	NA	CNS	1.3E-03	NA	8.7E-05	1.4E-03
			Mercury	NA	NA	NA	NA	Developmental, Neurological	6.5E-03	NA	4.3E-04	6.9E-03
			Chemical Total	2E-05	NA	8E-06	2E-05		1.2E-01	NA	2.7E-02	1.4E-01
		Exposure Point Total					2E-05					1.4E-01
	Exposure Medium Total						2E-05					1.4E-01

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (continued)	Air	Emissions from Surface Soil Outside Waste Area	Chromium	NA	5.2E-08	NA	5.2E-08	Respiratory System	NA	1.7E-05	NA	1.7E-05
			Chemical Total	NA	5.2E-08	NA	5.2E-08		NA	1.7E-05	NA	1.7E-05
		Exposure Point Total					5.2E-08					1.7E-05
	Exposure Medium Total						5.2E-08					1.7E-05
Surface Soil Outside Waste Area							2.3E-05					1.4E-01
Soil*	Soil*	Soil* in Sludge Area	Chromium	1.2E-06	NA	3.2E-06	4.4E-06	Not identified	2.3E-03	NA	5.9E-03	8.2E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	2.8E-02	NA	1.9E-03	3.0E-02
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	8.1E-03	NA	5.4E-04	8.7E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	1.7E-03	NA	1.1E-04	1.8E-03
			Chemical Total	1.2E-06	NA	3.2E-06	4.4E-06		4.0E-02	NA	8.5E-03	4.9E-02
		Exposure Point Total					4.4E-06					4.9E-02
	Exposure Medium Total						4.4E-06					4.9E-02
Soil* in Sludge Area							4.4E-06					4.9E-02
Receptor Total - Surface Soil In Waste Area							1.1E-05	Receptor Total - Surface Soil In Waste Area				1.1E+00
Receptor Total - Surface Soil Across Site							2.1E-05	Receptor Total - Surface Soil Across Site				3.2E-01
Receptor Total - Surface Soil Outside Waste Area							2.3E-05	Receptor Total - Surface Soil Outside Waste Area				1.4E-01
Receptor Total - Soil* in Sludge Area							4.4E-06	Receptor Total - Soil* in Sludge Area				4.9E-02

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

Surface Soil in Waste Area	
Total Ocular HI Across All Media =	5.6E-02
Total Finger and Toe Nails HI Across All Media =	5.6E-02
Total Neurological/Central Nervous System HI Across All Media =	9.5E-03
Total Skin HI Across All Media =	1.3E-02
Total Vascular HI Across All Media =	1.3E-02
Total Kidney HI Across All Media =	9.7E-01
Total Thyroid HI Across All Media =	1.2E-02
Total Gastrointestinal HI Across All Media =	1.1E-02
Total Respiratory System HI Across All Media =	2.2E-05

Surface Soil in Across Site	
Total Ocular HI Across All Media =	5.6E-02
Total Finger and Toe Nails HI Across All Media =	5.6E-02
Total Neurological/Central Nervous System HI Across All Media =	1.4E-02
Total Skin HI Across All Media =	8.1E-02
Total Vascular HI Across All Media =	8.1E-02
Total Kidney HI Across All Media =	1.4E-01
Total Thyroid HI Across All Media =	8.9E-03
Total Gastrointestinal HI Across All Media =	9.9E-03
Total Respiratory System HI Across All Media =	1.8E-05
Total Developmental HI Across All Media =	6.2E-03

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Surface Soil Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	1.5E-02
Total Skin HI Across All Media =	9.6E-02
Total Vascular HI Across All Media =	9.6E-02
Total Thyroid HI Across All Media =	8.9E-03
Total Gastrointestinal HI Across All Media =	1.0E-02
Total Developmental HI Across All Media =	6.9E-03
Total Respiratory System HI Across All Media =	1.7E-05

Soil* in Sludge Area

Total Neurological/Central Nervous System HI Across All Media =	1.8E-03
Total Thyroid HI Across All Media =	3.0E-02
Total Gastrointestinal HI Across All Media =	8.7E-03

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	NA	NA	NA	NA	CNS, Blood, Biliary Tract	1.4E-03	NA	5.7E-04	2.0E-03
			Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
			alpha-BHC	NA	NA	NA	NA	Liver	5.3E-05	NA	2.1E-05	7.4E-05
			Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	7.9E-01	NA	4.4E-01	1.2E+00
			Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dieldrin	NA	NA	NA	NA	Liver	1.1E-03	NA	4.3E-04	1.5E-03
			Heptachlor	NA	NA	NA	NA	Liver	3.8E-04	NA	1.5E-04	5.4E-04
			2,4,6-Trinitrotoluene	NA	NA	NA	NA	Liver	1.1E-02	NA	1.4E-03	1.3E-02
			Aluminum	NA	NA	NA	NA	Neurological	1.2E-01	NA	4.9E-03	1.3E-01
			Arsenic	NA	NA	NA	NA	Skin, Vascular	1.3E-02	NA	1.6E-03	1.5E-02
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	6.9E-01	NA	1.1E-01	8.0E-01
			Chromium	NA	NA	NA	NA	Not identified	9.7E-03	NA	1.5E-02	2.5E-02
			Cobalt	NA	NA	NA	NA	Thyroid	2.4E-02	NA	9.4E-04	2.5E-02
			Copper	NA	NA	NA	NA	Gastrointestinal	1.8E-01	NA	7.0E-03	1.8E-01
			Iron	NA	NA	NA	NA	Gastrointestinal	2.1E-02	NA	8.4E-04	2.2E-02
			Manganese	NA	NA	NA	NA	CNS	7.3E-03	NA	2.9E-04	7.6E-03
			Vanadium	NA	NA	NA	NA	Hair	9.2E-03	NA	3.7E-04	9.6E-03
			Chemical Total	NA	NA	NA	NA		1.9E+00	NA	5.9E-01	2.5E+00
		Exposure Point Total					NA					2.5E+00
	Exposure Medium Total						NA					2.5E+00
	Air	Emissions from Soil* in Waste Area	Chromium	NA	NA	NA	NA	Respiratory System	NA	1.5E-04	NA	1.5E-04
			Chemical Total	NA	NA	NA	NA		NA	1.5E-04	NA	1.5E-04
		Exposure Point Total					NA					1.5E-04
	Exposure Medium Total						NA					1.5E-04
Soil* In Waste Area							NA					2.5E+00

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	NA	NA	NA	NA	CNS, Blood, Biliary Tract	1.4E-04	NA	5.7E-05	2.0E-04
			Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
			alpha-BHC	NA	NA	NA	NA	Liver	6.7E-06	NA	2.7E-06	9.4E-06
			Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	2.2E-01	NA	1.2E-01	3.4E-01
			Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dieldrin	NA	NA	NA	NA	Liver	9.5E-05	NA	3.8E-05	1.3E-04
			Heptachlor	NA	NA	NA	NA	Liver	4.6E-05	NA	1.9E-05	6.5E-05
			2,4,6-Trinitrotoluene	NA	NA	NA	NA	Liver	3.7E-03	NA	4.7E-04	4.1E-03
			Aluminum	NA	NA	NA	NA	Neurological	3.6E-02	NA	1.4E-03	3.7E-02
			Antimony	NA	NA	NA	NA	Longevity, Blood	2.4E-03	NA	6.3E-04	3.0E-03
			Arsenic	NA	NA	NA	NA	Skin, Vascular	7.6E-02	NA	9.0E-03	8.5E-02
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	1.1E-01	NA	1.8E-02	1.3E-01
			Chromium	NA	NA	NA	NA	Not identified	7.9E-03	NA	1.3E-02	2.1E-02
			Cobalt	NA	NA	NA	NA	Thyroid	1.3E-02	NA	5.2E-04	1.4E-02
			Copper	NA	NA	NA	NA	Gastrointestinal	3.1E-02	NA	1.2E-03	3.2E-02
			Iron	NA	NA	NA	NA	Gastrointestinal	2.3E-02	NA	9.0E-04	2.4E-02
			Manganese	NA	NA	NA	NA	CNS	2.3E-03	NA	9.3E-05	2.4E-03
			Mercury	NA	NA	NA	NA	Developmental, Neurological	2.8E-03	NA	1.1E-04	2.9E-03
			Vanadium	NA	NA	NA	NA	Hair	5.1E-03	NA	2.0E-04	5.3E-03
			Chemical Total	NA	NA	NA	NA		5.3E-01	NA	1.7E-01	7.0E-01
		Exposure Point Total					NA					7.0E-01
	Exposure Medium Total						NA					7.0E-01

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Air	Emissions from Soil* Across Site	Chromium	NA	NA	NA	NA	Respiratory System	NA	1.2E-04	NA	1.2E-04
			Chemical Total	NA	NA	NA	NA		NA	1.2E-04	NA	1.2E-04
		Exposure Point Total					NA					1.2E-04
	Exposure Medium Total						NA					1.2E-04
Soil* Across Site							NA					7.0E-01
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	9.5E-03	NA	3.8E-04	9.9E-03
			Antimony	NA	NA	NA	NA	Longevity, Blood	2.6E-03	NA	6.9E-04	3.3E-03
			Arsenic	NA	NA	NA	NA	Skin, Vascular	9.4E-02	NA	1.1E-02	1.1E-01
			Chromium	NA	NA	NA	NA	Not identified	6.2E-03	NA	1.0E-02	1.6E-02
			Cobalt	NA	NA	NA	NA	Thyroid	1.3E-02	NA	5.1E-04	1.3E-02
			Iron	NA	NA	NA	NA	Gastrointestinal	2.0E-02	NA	7.9E-04	2.1E-02
			Manganese	NA	NA	NA	NA	CNS	1.3E-03	NA	5.2E-05	1.4E-03
			Mercury	NA	NA	NA	NA	Developmental, Neurological	3.2E-03	NA	1.3E-04	3.3E-03
			Vanadium	NA	NA	NA	NA	Hair	2.6E-01	NA	2.1E-04	2.6E-01
			Chemical Total	NA	NA	NA	NA		4.1E-01	NA	2.4E-02	4.3E-01
		Exposure Point Total					NA					4.3E-01
	Exposure Medium Total						NA					4.3E-01
Soil* (continued)	Air	Emissions from Soil* Outside Waste Area	Chromium	NA	NA	NA	NA	Respiratory System	NA	9.6E-05	NA	9.6E-05
			Chemical Total	NA	NA	NA	NA		NA	9.6E-05	NA	9.6E-05
		Exposure Point Total					NA					9.6E-05
	Exposure Medium Total						NA					9.6E-05
Soil* Outside Waste Area							NA					4.3E-01

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Sludge Area	Chromium	NA	NA	NA	NA	Not identified	3.2E-03	NA	5.0E-03	8.2E-03
			Cobalt	NA	NA	NA	NA	Thyroid	4.0E-02	NA	1.6E-03	4.1E-02
			Iron	NA	NA	NA	NA	Gastrointestinal	1.1E-02	NA	4.5E-04	1.2E-02
			Manganese	NA	NA	NA	NA	CNS	2.4E-03	NA	9.6E-05	2.5E-03
			Chemical Total	NA	NA	NA	NA		5.7E-02	NA	7.2E-03	6.4E-02
		Exposure Point Total					NA					6.4E-02
	Exposure Medium Total						NA					6.4E-02
Soil* in Sludge Area							NA					6.4E-02
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Heptachlor epoxide	NA	NA	NA	NA	Liver	5.7E-02	NA	9.0E-02	1.5E-01
			RDX	NA	NA	NA	NA	Prostate	1.6E-02	NA	1.4E-04	1.6E-02
			Chemical Total	NA	NA	NA	NA		7.4E-02	NA	9.1E-02	1.6E-01
		Exposure Point Total					NA					1.6E-01
	Exposure Medium Total						NA					1.6E-01
Shallow Aquifer Groundwater Total							NA					1.6E-01
Groundwater	Groundwater	Yorktown Eastover Deep Aquifer Tap Water	Heptachlor epoxide	NA	NA	NA	NA	Liver	2.1E-02	NA	3.3E-02	5.3E-02
			Manganese	NA	NA	NA	NA	CNS	1.3E-01	NA	1.7E-02	1.5E-01
			Chemical Total	NA	NA	NA	NA		1.5E-01	NA	4.9E-02	2.0E-01
		Exposure Point Total					NA					2.0E-01
	Exposure Medium Total						NA					2.0E-01
Deep Aquifer Groundwater Total							NA					2.0E-01
Receptor Total -Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							NA	Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				2.6E+00
Receptor Total -Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater				2.7E+00
Receptor Total - Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater							NA	Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater				8.6E-01
Receptor Total - Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater				9.0E-01
Receptor Total - Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							NA	Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				6.0E-01
Receptor Total - Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater				6.3E-01
Receptor Total - Soil* in Sludge Area and Cornwalis Cave Shallow Aquifer Groundwater							NA	Soil* in Sludge Area and Cornwalis Cave Shallow Aquifer Groundwater				2.3E-01

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Receptor Total - Soil* in Sludge Area and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* in Sludge Area and Yorktown Eastover Deep Aquifer Groundwater				2.6E-01

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

Soil* in Waste Area

Total Neurological/Central Nervous System HI Across All Media =	1.4E-01
Total Biliary/Liver HI Across All Media =	1.7E-02
Total Blood HI Across All Media =	2.0E-03
Total Ocular HI Across All Media =	1.2E+00
Total Finger and Toe Nails HI Across All Media =	1.2E+00
Total Skin HI Across All Media =	1.5E-02
Total Vascular HI Across All Media =	1.5E-02
Total Kidney HI Across All Media =	8.0E-01
Total Thyroid HI Across All Media =	2.5E-02
Total Gastrointestinal HI Across All Media =	2.1E-01
Total Hair HI Across All Media =	9.6E-03
Total Respiratory System HI Across All Media =	1.5E-04

Soil* in Across Site

Total Neurological/Central Nervous System HI Across All Media =	4.3E-02
Total Biliary/Liver HI Across All Media =	4.5E-03
Total Blood HI Across All Media =	3.2E-03
Total Ocular HI Across All Media =	3.4E-01
Total Finger and Toe Nails HI Across All Media =	3.4E-01
Total Longevity HI Across All Media =	3.0E-03
Total Skin HI Across All Media =	8.5E-02
Total Vascular HI Across All Media =	8.5E-02
Total Kidney HI Across All Media =	1.3E-01
Total Thyroid HI Across All Media =	1.4E-02
Total Gastrointestinal HI Across All Media =	5.6E-02
Total Developmental HI Across All Media =	2.9E-03
Total Hair HI Across All Media =	5.3E-03
Total Respiratory System HI Across All Media =	1.2E-04

Soil* Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	1.5E-02
Total Blood HI Across All Media =	3.3E-03
Total Longevity HI Across All Media =	3.3E-03
Total Skin HI Across All Media =	1.1E-01
Total Vascular HI Across All Media =	1.1E-01
Total Thyroid HI Across All Media =	1.3E-02
Total Gastrointestinal HI Across All Media =	2.1E-02
Total Developmental HI Across All Media =	3.3E-03
Total Hair HI Across All Media =	2.6E-01
Total Respiratory System HI Across All Media =	9.6E-05

Soil* in Sludge Area

Total Neurological/Central Nervous System HI Across All Media =	2.5E-03
Total Thyroid HI Across All Media =	4.1E-02
Total Gastrointestinal HI Across All Media =	1.2E-02

Cornwalis Cave Shallow Aquifer Groundwater

Total Liver HI Across All Media =	1.5E-01
Total Prostrate HI Across All Media =	1.6E-02

Yorktown Eastover Deep Aquifer Groundwater

Total Liver HI Across All Media =	5.3E-02
Total Neurological/Central Nervous System HI Across All Media =	1.5E-01

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	NA	NA	NA	NA	CNS, Blood, Biliary Tract	1.3E-02	NA	3.8E-03	1.7E-02
			Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
			alpha-BHC	NA	NA	NA	NA	Liver	4.9E-04	NA	1.4E-04	6.3E-04
			Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	7.4E+00	NA	2.9E+00	1.0E+01
			Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dieldrin	NA	NA	NA	NA	Liver	1.0E-02	NA	2.8E-03	1.3E-02
			Heptachlor	NA	NA	NA	NA	Liver	3.6E-03	NA	1.0E-03	4.6E-03
			2,4,6-Trinitrotoluene	NA	NA	NA	NA	Liver	1.0E-01	NA	9.4E-03	1.1E-01
			Aluminum	NA	NA	NA	NA	Neurological	1.1E+00	NA	3.2E-02	1.2E+00
			Arsenic	NA	NA	NA	NA	Skin, Vascular	1.2E-01	NA	1.0E-02	1.3E-01
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	6.4E+00	NA	7.2E-01	7.2E+00
			Chromium	NA	NA	NA	NA	Not identified	9.0E-02	NA	1.0E-01	1.9E-01
			Cobalt	NA	NA	NA	NA	Thyroid	2.2E-01	NA	6.2E-03	2.3E-01
			Copper	NA	NA	NA	NA	Gastrointestinal	1.6E+00	NA	4.6E-02	1.7E+00
			Iron	NA	NA	NA	NA	Gastrointestinal	2.0E-01	NA	5.5E-03	2.0E-01
			Manganese	NA	NA	NA	NA	CNS	6.8E-02	NA	1.9E-03	7.0E-02
			Vanadium	NA	NA	NA	NA	Hair	8.6E-02	NA	2.4E-03	8.8E-02
			Chemical Total	NA	NA	NA	NA		1.8E+01	NA	3.9E+00	2.1E+01
		Exposure Point Total					NA					2.1E+01
	Exposure Medium Total						NA					2.1E+01
	Air	Emissions from Soil* in Waste Area	Chromium	NA	NA	NA	NA	Respiratory System	NA	1.5E-04	NA	1.5E-04
			Chemical Total	NA	NA	NA	NA		NA	1.5E-04	NA	1.5E-04
		Exposure Point Total					NA					1.5E-04
	Exposure Medium Total						NA					1.5E-04
Soil* In Waste Area							NA					**2.1E+01**

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	NA	NA	NA	NA	CNS, Blood, Biliary Tract	1.3E-03	NA	3.7E-04	1.7E-03
			Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
			alpha-BHC	NA	NA	NA	NA	Liver	6.3E-05	NA	1.8E-05	8.0E-05
			Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	2.0E+00	NA	8.0E-01	2.8E+00
			Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dieldrin	NA	NA	NA	NA	Liver	8.9E-04	NA	2.5E-04	1.1E-03
			Heptachlor	NA	NA	NA	NA	Liver	4.3E-04	NA	1.2E-04	5.5E-04
			2,4,6-Trinitrotoluene	NA	NA	NA	NA	Liver	3.4E-02	NA	3.1E-03	3.7E-02
			Aluminum	NA	NA	NA	NA	Neurological	3.3E-01	NA	9.3E-03	3.4E-01
			Antimony	NA	NA	NA	NA	Longevity, Blood	2.2E-02	NA	4.1E-03	2.6E-02
			Arsenic	NA	NA	NA	NA	Skin, Vascular	7.0E-01	NA	5.9E-02	7.6E-01
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	1.0E+00	NA	1.2E-01	1.2E+00
			Chromium	NA	NA	NA	NA	Not identified	7.4E-02	NA	8.3E-02	1.6E-01
			Cobalt	NA	NA	NA	NA	Thyroid	1.2E-01	NA	3.4E-03	1.3E-01
			Copper	NA	NA	NA	NA	Gastrointestinal	2.9E-01	NA	8.1E-03	3.0E-01
			Iron	NA	NA	NA	NA	Gastrointestinal	2.1E-01	NA	5.9E-03	2.2E-01
			Manganese	NA	NA	NA	NA	CNS	2.2E-02	NA	6.1E-04	2.2E-02
			Mercury	NA	NA	NA	NA	Developmental, Neurological	2.6E-02	NA	7.4E-04	2.7E-02
			Vanadium	NA	NA	NA	NA	Hair	4.7E-02	NA	1.3E-03	4.9E-02
			Chemical Total	NA	NA	NA	NA		5.0E+00	NA	1.1E+00	6.1E+00
		Exposure Point Total					NA					6.1E+00
	Exposure Medium Total						NA					6.1E+00

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Air	Emissions from Soil* Across Site	Chromium	NA	NA	NA	NA	Respiratory System	NA	1.2E-04	NA	1.2E-04
			Chemical Total	NA	NA	NA	NA		NA	1.2E-04	NA	1.2E-04
		Exposure Point Total					NA					1.2E-04
	Exposure Medium Total						NA					1.2E-04
Soil* Across Site							NA					6.1E+00
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	8.9E-02	NA	2.5E-03	9.1E-02
			Antimony	NA	NA	NA	NA	Longevity, Blood	2.4E-02	NA	4.5E-03	2.9E-02
			Arsenic	NA	NA	NA	NA	Skin, Vascular	8.8E-01	NA	7.4E-02	9.5E-01
			Chromium	NA	NA	NA	NA	Not identified	5.8E-02	NA	6.5E-02	1.2E-01
			Cobalt	NA	NA	NA	NA	Thyroid	1.2E-01	NA	3.3E-03	1.2E-01
			Iron	NA	NA	NA	NA	Gastrointestinal	1.9E-01	NA	5.2E-03	1.9E-01
			Manganese	NA	NA	NA	NA	CNS	1.2E-02	NA	3.4E-04	1.3E-02
			Mercury	NA	NA	NA	NA	Developmental, Neurological	3.0E-02	NA	8.4E-04	3.1E-02
			Vanadium	NA	NA	NA	NA	Hair	4.8E-02	NA	1.3E-03	4.9E-02
			Chemical Total	NA	NA	NA	NA		1.4E+00	NA	1.6E-01	1.6E+00
		Exposure Point Total					NA					1.6E+00
	Exposure Medium Total						NA					1.6E+00
Soil* (continued)	Air	Emissions from Soil* Outside Waste Area	Chromium	NA	NA	NA	NA	Respiratory System	NA	9.6E-05	NA	9.6E-05
			Chemical Total	NA	NA	NA	NA		NA	9.6E-05	NA	9.6E-05
		Exposure Point Total					NA					9.6E-05
	Exposure Medium Total						NA					9.6E-05
Soil* Outside Waste Area							NA					1.6E+00

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Sludge Area	Chromium	NA	NA	NA	NA	Not identified	2.9E-02	NA	3.3E-02	6.2E-02
			Cobalt	NA	NA	NA	NA	Thyroid	3.7E-01	NA	1.0E-02	3.8E-01
			Iron	NA	NA	NA	NA	Gastrointestinal	1.1E-01	NA	3.0E-03	1.1E-01
			Manganese	NA	NA	NA	NA	CNS	2.2E-02	NA	6.3E-04	2.3E-02
			Chemical Total	NA	NA	NA	NA		5.3E-01	NA	4.7E-02	5.8E-01
		Exposure Point Total					NA					5.8E-01
	Exposure Medium Total						NA					5.8E-01
Soil* in Sludge Area							NA					5.8E-01
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Heptachlor epoxide	NA	NA	NA	NA	Liver	1.3E-01	NA	2.0E-01	3.4E-01
			RDX	NA	NA	NA	NA	Prostate	3.8E-02	NA	3.2E-04	3.8E-02
			Chemical Total	NA	NA	NA	NA		1.7E-01	NA	2.0E-01	3.8E-01
		Exposure Point Total					NA					3.8E-01
	Exposure Medium Total						NA					3.8E-01
Shallow Aquifer Groundwater Total							NA					3.8E-01
Groundwater	Groundwater	Eastover Deep Aquifer Tap Water	Heptachlor epoxide	NA	NA	NA	NA	Liver	4.8E-02	NA	7.3E-02	1.2E-01
			Manganese	NA	NA	NA	NA	CNS	3.0E-01	NA	5.0E-02	3.5E-01
			Chemical Total	NA	NA	NA	NA		3.5E-01	NA	1.2E-01	4.7E-01
		Exposure Point Total					NA					4.7E-01
	Exposure Medium Total						NA					4.7E-01
Deep Aquifer Groundwater Total							NA					4.7E-01
Receptor Total -Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							NA	Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				2.2E+01
Receptor Total -Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater				2.2E+01
Receptor Total - Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater							NA	Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater				6.4E+00
Receptor Total - Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater				6.5E+00
Receptor Total - Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							NA	Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				2.0E+00
Receptor Total - Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater				2.1E+00
Receptor Total - Soil* in Sludge Area and Cornwalis Cave Shallow Aquifer Groundwater							NA	Soil* in Sludge Area and Cornwalis Cave Shallow Aquifer Groundwater				9.5E-01
Receptor Total - Soil* in Sludge Area and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* in Sludge Area and Yorktown Eastover Deep Aquifer Groundwater				1.0E+00

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

Soil* in Waste Area

Total Neurological/Central Nervous System HI Across All Media =	1.3E+00
Total Biliary/Liver HI Across All Media =	1.5E-01
Total Blood HI Across All Media =	1.7E-02
Total Ocular HI Across All Media =	1.0E+01
Total Finger and Toe Nails HI Across All Media =	1.0E+01
Total Skin HI Across All Media =	1.3E-01
Total Vascular HI Across All Media =	1.3E-01
Total Kidney HI Across All Media =	7.2E+00
Total Thyroid HI Across All Media =	2.3E-01
Total Gastrointestinal HI Across All Media =	1.9E+00
Total Hair HI Across All Media =	8.8E-02
Total Respiratory System HI Across All Media =	1.5E-04

Soil* in Across Site

Total Neurological/Central Nervous System HI Across All Media =	3.9E-01
Total Biliary/Liver HI Across All Media =	4.1E-02
Total Blood HI Across All Media =	2.8E-02
Total Ocular HI Across All Media =	2.8E+00
Total Finger and Toe Nails HI Across All Media =	2.8E+00
Total Longevity HI Across All Media =	2.6E-02
Total Skin HI Across All Media =	7.6E-01
Total Vascular HI Across All Media =	7.6E-01
Total Kidney HI Across All Media =	1.2E+00
Total Thyroid HI Across All Media =	1.3E-01
Total Gastrointestinal HI Across All Media =	5.1E-01
Total Developmental HI Across All Media =	2.7E-02
Total Hair HI Across All Media =	4.9E-02
Total Respiratory System HI Across All Media =	1.2E-04

Soil* Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	1.3E-01
Total Blood HI Across All Media =	2.9E-02
Total Longevity HI Across All Media =	2.9E-02
Total Skin HI Across All Media =	9.5E-01
Total Vascular HI Across All Media =	9.5E-01
Total Thyroid HI Across All Media =	1.2E-01
Total Gastrointestinal HI Across All Media =	1.9E-01
Total Developmental HI Across All Media =	3.1E-02
Total Hair HI Across All Media =	4.9E-02
Total Respiratory System HI Across All Media =	9.6E-05

Soil* in Sludge Area

Total Neurological/Central Nervous System HI Across All Media =	2.3E-02
Total Thyroid HI Across All Media =	3.8E-01
Total Gastrointestinal HI Across All Media =	1.1E-01

Cornwalis Cave Shallow Aquifer Groundwater

Total Liver HI Across All Media =	3.4E-01
Total Prostrate HI Across All Media =	3.8E-02

Yorktown Eastover Deep Aquifer Groundwater

Total Liver HI Across All Media =	1.2E-01
Total Neurological/Central Nervous System HI Across All Media =	3.5E-01

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	1.0E-06	NA	3.2E-07	1.3E-06		NA	NA	NA	NA
			Benzo(a)anthracene	2.1E-07	NA	1.0E-07	3.1E-07		NA	NA	NA	NA
			Benzo(a)pyrene	2.0E-06	NA	9.9E-07	3.0E-06		NA	NA	NA	NA
			Benzo(b)fluoranthene	2.7E-07	NA	1.4E-07	4.1E-07		NA	NA	NA	NA
			Benzo(k)fluoranthene	2.3E-08	NA	1.1E-08	3.4E-08		NA	NA	NA	NA
			Chrysene	2.4E-09	NA	1.2E-09	3.7E-09		NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	1.0E-06	NA	3.2E-07	1.3E-06		NA	NA	NA	NA
			alpha-BHC	3.0E-06	NA	9.6E-07	4.0E-06		NA	NA	NA	NA
			Aroclor-1254	3.6E-05	NA	1.6E-05	5.2E-05		NA	NA	NA	NA
			Aroclor-1260	2.3E-06	NA	1.0E-06	3.3E-06		NA	NA	NA	NA
			Dieldrin	1.0E-06	NA	3.1E-07	1.3E-06		NA	NA	NA	NA
			Heptachlor	9.9E-07	NA	3.1E-07	1.3E-06		NA	NA	NA	NA
			2,4,6-Trinitrotoluene	1.9E-07	NA	1.9E-08	2.1E-07		NA	NA	NA	NA
			Aluminum	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Arsenic	6.8E-06	NA	6.5E-07	7.5E-06		NA	NA	NA	NA
			Cadmium	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chromium	7.1E-05	NA	1.1E-04	1.8E-04		NA	NA	NA	NA
			Cobalt	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Copper	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Iron	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Manganese	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Vanadium	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chemical Total	1.3E-04	NA	1.3E-04	2.6E-04		NA	NA	NA	NA
		Exposure Point Total					2.6E-04					NA
	Exposure Medium Total						2.6E-04					NA
	Air	Emissions from Soil* in Waste Area	Chromium	NA	1.4E-06	NA	1.4E-06		NA	NA	NA	NA
			Chemical Total	NA	1.4E-06	NA	1.4E-06		NA	NA	NA	NA
		Exposure Point Total					1.4E-06					NA
	Exposure Medium Total						1.4E-06					NA
Soil* In Waste Area							**2.6E-04**					NA

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	1.0E-07	NA	3.2E-08	1.3E-07		NA	NA	NA	NA
			Benzo(a)anthracene	3.4E-07	NA	1.7E-07	5.2E-07		NA	NA	NA	NA
			Benzo(a)pyrene	5.5E-06	NA	2.8E-06	8.4E-06		NA	NA	NA	NA
			Benzo(b)fluoranthene	4.4E-07	NA	2.2E-07	6.6E-07		NA	NA	NA	NA
			Benzo(k)fluoranthene	4.2E-08	NA	2.1E-08	6.3E-08		NA	NA	NA	NA
			Chrysene	4.2E-09	NA	2.1E-09	6.3E-09		NA	NA	NA	NA
			Dibenz(a,h)anthracene	2.2E-06	NA	1.1E-06	3.3E-06		NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	7.3E-07	NA	3.7E-07	1.1E-06		NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	1.0E-06	NA	3.2E-07	1.3E-06		NA	NA	NA	NA
			alpha-BHC	3.9E-07	NA	1.2E-07	5.1E-07		NA	NA	NA	NA
			Aroclor-1254	1.0E-05	NA	4.4E-06	1.4E-05		NA	NA	NA	NA
			Aroclor-1260	6.9E-07	NA	3.0E-07	9.9E-07		NA	NA	NA	NA
			Dieldrin	8.7E-08	NA	2.7E-08	1.1E-07		NA	NA	NA	NA
			Heptachlor	1.2E-07	NA	3.8E-08	1.6E-07		NA	NA	NA	NA
			2,4,6-Trinitrotoluene	6.3E-08	NA	6.4E-09	6.9E-08		NA	NA	NA	NA
			Aluminum	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Antimony	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Arsenic	3.9E-05	NA	3.7E-06	4.3E-05		NA	NA	NA	NA
			Cadmium	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chromium	5.8E-05	NA	9.1E-05	1.5E-04		NA	NA	NA	NA
			Cobalt	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Copper	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Iron	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Manganese	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Mercury	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Vanadium	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chemical Total	1.2E-04	0.0E+00	1.0E-04	2.2E-04		NA	NA	NA	NA
		Exposure Point Total					2.2E-04					NA
	Exposure Medium Total						2.2E-04					NA

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Air	Emissions from Soil* Across Site	Chromium	NA	1.1E-06	NA	1.1E-06		NA	NA	NA	NA
			Chemical Total	NA	1.1E-06	NA	1.1E-06		NA	NA	NA	NA
		Exposure Point Total					1.1E-06					NA
	Exposure Medium Total						1.1E-06					NA
Soil* Across Site							2.2E-04					NA
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	3.5E-07	NA	1.8E-07	5.3E-07		NA	NA	NA	NA
			Benzo(a)pyrene	4.8E-06	NA	2.4E-06	7.2E-06		NA	NA	NA	NA
			Benzo(b)fluoranthene	4.7E-07	NA	2.4E-07	7.1E-07		NA	NA	NA	NA
			Benzo(k)fluoranthene	4.5E-08	NA	2.3E-08	6.8E-08		NA	NA	NA	NA
			Chrysene	4.4E-09	NA	2.2E-09	6.6E-09		NA	NA	NA	NA
			Dibenz(a,h)anthracene	2.2E-06	NA	1.1E-06	3.3E-06		NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	7.3E-07	NA	3.7E-07	1.1E-06		NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA		NA	NA	NA	NA
			Antimony	NA	NA	NA	NA		NA	NA	NA	NA
			Arsenic	4.8E-05	NA	4.6E-06	5.3E-05		NA	NA	NA	NA
			Chromium	4.6E-05	NA	7.2E-05	1.2E-04		NA	NA	NA	NA
			Cobalt	NA	NA	NA	NA		NA	NA	NA	NA
			Iron	NA	NA	NA	NA		NA	NA	NA	NA
			Manganese	NA	NA	NA	NA		NA	NA	NA	NA
			Mercury	NA	NA	NA	NA		NA	NA	NA	NA
			Vanadium	NA	NA	NA	NA		NA	NA	NA	NA
			Chemical Total	1.0E-04	NA	8.1E-05	1.8E-04		NA	NA	NA	NA
		Exposure Point Total					1.8E-04					NA
	Exposure Medium Total						1.8E-04					NA
	Air	Emissions from Soil* Outside Waste Area	Chromium	NA	8.8E-07	NA	8.8E-07		NA	NA	NA	NA
			Chemical Total	NA	8.8E-07	NA	8.8E-07		NA	NA	NA	NA
		Exposure Point Total					8.8E-07					NA
	Exposure Medium Total						8.8E-07					NA
Soil* Outside Waste Area							1.8E-04					NA

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Sludge Area	Chromium	2.3E-05	NA	3.6E-05	5.9E-05		NA	NA	NA	NA
			Cobalt	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Iron	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Manganese	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chemical Total	2.3E-05	NA	3.6E-05	5.9E-05		NA	NA	NA	NA
		Exposure Point Total					5.9E-05					NA
	Exposure Medium Total						5.9E-05					NA
Soil* in Sludge Area							5.9E-05					NA
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Heptachlor epoxide	3.7E-06	NA	5.7E-06	9.4E-06		NA	NA	NA	NA
			RDX	2.9E-06	NA	2.5E-08	2.9E-06		NA	NA	NA	NA
			Chemical Total	6.6E-06	NA	5.7E-06	1.2E-05		NA	NA	NA	NA
		Exposure Point Total					1.2E-05					NA
	Exposure Medium Total						1.2E-05					NA
Shallow Aquifer Groundwater Total							**1.2E-05**					NA
Groundwater	Groundwater	Yorktown-Eastover Deep Aquifer Tap Water	Heptachlor epoxide	1.3E-06	NA	2.1E-06	3.4E-06		NA	NA	NA	NA
			Manganese	NA	NA	NA	NA		NA	NA	NA	NA
			Chemical Total	1.3E-06	NA	2.1E-06	3.4E-06		NA	NA	NA	NA
		Exposure Point Total					3.4E-06					NA
	Exposure Medium Total						3.4E-06					NA
Deep Aquifer Groundwater Total							3.4E-06					NA
Receptor Total -Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							2.7E-04	Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				NA
Receptor Total -Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater							2.6E-04	Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater				NA
Receptor Total - Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater							2.4E-04	Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater				NA
Receptor Total - Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater							2.3E-04	Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater				NA
Receptor Total - Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							2.0E-04	Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				NA
Receptor Total - Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater							1.9E-04	Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater				NA
Receptor Total - Soil* in Sludge Area and Cornwalis Cave Shallow Aquifer Groundwater							7.2E-05	Soil* in Sludge Area and Cornwalis Cave Shallow Aquifer Groundwater				NA

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Receptor Total - Soil* in Sludge Area and Yorktown Eastover Deep Aquifer Groundwater							6.3E-05	Soil* in Sludge Area and Yorktown Eastover Deep Aquifer Groundwater				NA

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	\	NA	4.5E-09	2.6E-08	CNS, Blood, Biliary Tract	2.5E-03	NA	5.1E-04	3.0E-03
			Benzo(a)anthracene	1.0E-09	NA	2.8E-10	1.3E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	9.8E-09	NA	2.6E-09	1.2E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	1.4E-09	NA	3.7E-10	1.7E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	1.1E-10	NA	3.0E-11	1.4E-10	NA	NA	NA	NA	NA
			Chrysene	1.2E-11	NA	3.3E-12	1.6E-11	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	2.2E-08	NA	4.5E-09	2.6E-08	NA	NA	NA	NA	NA
			alpha-BHC	6.5E-08	NA	1.3E-08	7.9E-08	Liver	9.1E-05	NA	1.9E-05	1.1E-04
			Aroclor-1254	7.8E-07	NA	2.2E-07	1.0E-06	Immune System	9.1E-01	NA	2.6E-01	1.2E+00
			Aroclor-1260	5.0E-08	NA	1.4E-08	6.4E-08	NA	NA	NA	NA	NA
			Dieldrin	2.1E-08	NA	4.4E-09	2.6E-08	Liver	9.3E-04	NA	1.9E-04	1.1E-03
			Heptachlor	2.1E-08	NA	4.4E-09	2.6E-08	Liver	3.3E-03	NA	6.8E-04	4.0E-03
			2,4,6-Trinitrotoluene	4.1E-09	NA	2.7E-10	4.4E-09	Liver	1.9E-02	NA	1.3E-03	2.1E-02
			Aluminum	NA	NA	NA	0.0E+00	Neurological	2.1E-01	NA	4.4E-03	2.2E-01
			Arsenic	1.5E-07	NA	9.0E-09	1.5E-07	Skin, Vascular	2.3E-02	NA	1.4E-03	2.4E-02
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	1.2E+00	NA	9.8E-02	1.3E+00
			Chromium	3.6E-07	NA	2.9E-07	6.5E-07	Not identified	2.5E-03	NA	2.1E-03	4.5E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	4.0E-03	NA	8.3E-05	4.1E-03
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	1.2E+00	NA	2.5E-02	1.2E+00
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	3.6E-02	NA	7.4E-04	3.7E-02
			Manganese	NA	NA	NA	0.0E+00	CNS	1.3E-02	NA	2.6E-04	1.3E-02
			Vanadium	NA	NA	NA	0.0E+00	Hair	1.6E-02	NA	3.3E-04	1.6E-02
			Chemical Total	1.5E-06	NA	5.8E-07	2.1E-06		3.6E+00	NA	4.0E-01	4.0E+00
		Exposure Point Total					2.1E-06					4.0E+00
	Exposure Medium Total						2.1E-06					4.0E+00
	Air	Emissions from Soil* in Waste Area	Chromium	NA	2.1E-09	NA	2.1E-09	Respiratory System	NA	1.8E-05	NA	1.8E-05
			Chemical Total	NA	2.1E-09	NA	2.1E-09		NA	1.8E-05	NA	1.8E-05
		Exposure Point Total					2.1E-09					1.8E-05
	Exposure Medium Total						2.1E-09					1.8E-05
Soil* In Waste Area							2.1E-06					4.0E+00

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	2.2E-09	NA	4.5E-10	2.6E-09	CNS, Blood, Biliary Tract	2.4E-04	NA	5.0E-05	2.9E-04
			Benzo(a)anthracene	1.7E-09	NA	4.6E-10	2.2E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2.8E-08	NA	7.4E-09	3.5E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2.2E-09	NA	5.9E-10	2.8E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2.1E-10	NA	5.6E-11	2.6E-10	NA	NA	NA	NA	NA
			Chrysene	2.1E-11	NA	5.6E-12	2.7E-11	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	1.1E-08	NA	3.0E-09	1.4E-08	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	3.7E-09	NA	9.8E-10	4.7E-09	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	2.2E-08	NA	4.5E-09	2.6E-08	NA	NA	NA	NA	NA
			alpha-BHC	8.3E-09	NA	1.7E-09	1.0E-08	Liver	1.2E-05	NA	2.4E-06	1.4E-05
			Aroclor-1254	2.1E-07	NA	6.2E-08	2.7E-07	Immune System	2.5E-01	NA	7.2E-02	3.2E-01
			Aroclor-1260	1.5E-08	NA	4.3E-09	1.9E-08	NA	NA	NA	NA	NA
			Dieldrin	1.9E-09	NA	3.8E-10	2.2E-09	Liver	8.2E-05	NA	1.7E-05	9.8E-05
			Heptachlor	2.6E-09	NA	5.3E-10	3.1E-09	Liver	4.0E-04	NA	8.2E-05	4.8E-04
			2,4,6-Trinitrotoluene	1.3E-09	NA	8.9E-11	1.4E-09	Liver	6.3E-03	NA	4.2E-04	6.7E-03
			Aluminum	NA	NA	NA	0.0E+00	Neurological	6.1E-02	NA	1.3E-03	6.2E-02
			Antimony	NA	NA	NA	0.0E+00	Whole Body, Blood	4.1E-03	NA	5.6E-04	4.6E-03
			Arsenic	8.3E-07	NA	5.1E-08	8.8E-07	Skin, Vascular	1.3E-01	NA	8.0E-03	1.4E-01
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	1.9E-01	NA	1.6E-02	2.1E-01
			Chromium	2.9E-07	NA	2.4E-07	5.3E-07	Not identified	2.0E-03	NA	1.7E-03	3.7E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	2.2E-03	NA	4.6E-05	2.3E-03
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	2.1E-01	NA	4.4E-03	2.2E-01
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	3.9E-02	NA	8.0E-04	4.0E-02
			Manganese	NA	NA	NA	0.0E+00	CNS	4.0E-03	NA	8.3E-05	4.1E-03
			Mercury	NA	NA	NA	0.0E+00	Developmental, Neurological	4.8E-03	NA	1.0E-04	4.9E-03
			Vanadium	NA	NA	NA	0.0E+00	Hair	8.7E-03	NA	1.8E-04	8.9E-03
			Chemical Total	1.4E-06	NA	3.8E-07	1.8E-06		9.1E-01	NA	1.1E-01	1.0E+00
		Exposure Point Total					1.8E-06					1.0E+00
	Exposure Medium Total						1.8E-06					1.0E+00

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Air	Emissions from Soil* Across Site	Chromium	NA	1.7E-09	NA	1.7E-09	Respiratory System	NA	1.5E-05	NA	1.5E-05
			Chemical Total	NA	1.7E-09	NA	1.7E-09		NA	1.5E-05	NA	1.5E-05
		Exposure Point Total					1.7E-09					1.5E-05
	Exposure Medium Total						1.7E-09					1.5E-05
Soil* Across Site							1.8E-06					1.0E+00
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	1.8E-09	NA	4.7E-10	2.2E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2.4E-08	NA	6.4E-09	3.0E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2.4E-09	NA	6.3E-10	3.0E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2.3E-10	NA	6.1E-11	2.9E-10	NA	NA	NA	NA	NA
			Chrysene	2.2E-11	NA	5.8E-12	2.8E-11	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	1.1E-08	NA	3.0E-09	1.4E-08	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	3.7E-09	NA	9.8E-10	4.7E-09	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	1.6E-02	NA	2.5E-03	1.9E-02
			Antimony	NA	NA	NA	NA	Whole Body, Blood	4.5E-03	NA	9.1E-04	5.4E-03
			Arsenic	1.0E-06	NA	6.4E-08	1.1E-06	Skin, Vascular	1.6E-01	NA	3.7E-01	5.3E-01
			Chromium	2.3E-07	NA	1.9E-07	4.2E-07	Not identified	1.6E-03	NA	9.8E-03	1.1E-02
			Cobalt	NA	NA	NA	NA	Thyroid	2.2E-03	NA	3.3E-04	2.5E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	3.4E-02	NA	5.2E-03	3.9E-02
			Manganese	NA	NA	NA	NA	CNS	2.2E-03	NA	3.4E-04	2.6E-03
			Mercury	NA	NA	NA	NA	Developmental, Neurological	5.5E-03	NA	8.4E-04	6.4E-03
			Vanadium	NA	NA	NA	NA	Hair	8.8E-03	NA	1.3E-03	1.0E-02
			Chemical Total	1.3E-06	NA	2.6E-07	1.6E-06		2.4E-01	NA	3.9E-01	6.3E-01
		Exposure Point Total					1.6E-06					6.3E-01
	Exposure Medium Total						1.6E-06					6.3E-01
Soil* (continued)	Air	Emissions from Soil* Outside Waste Area	Chromium	NA	1.4E-09	NA	1.4E-09	Respiratory System	NA	1.1E-05	NA	1.1E-05
			Chemical Total	NA	1.4E-09	NA	1.4E-09		NA	1.1E-05	NA	1.1E-05
		Exposure Point Total					1.4E-09					1.1E-05
	Exposure Medium Total						1.4E-09					1.1E-05
Soil* Outside Waste Area							1.6E-06					6.3E-01

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil in Sludge Area	Chromium	1.2E-07	NA	9.5E-08	2.1E-07	Not identified	8.1E-04	NA	6.7E-04	1.5E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	6.8E-03	NA	1.4E-04	7.0E-03
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	2.0E-02	NA	4.0E-04	2.0E-02
			Manganese	NA	NA	NA	0.0E+00	CNS	4.1E-03	NA	8.5E-05	4.2E-03
			Chemical Total	1.2E-07	NA	9.5E-08	2.1E-07		3.1E-02	NA	1.3E-03	3.3E-02
		Exposure Point Total					2.1E-07					3.3E-02
	Exposure Medium Total						2.1E-07					3.3E-02
Soil* in Sludge Area							2.1E-07					3.3E-02
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Heptachlor epoxide	NA	NA	6.4E-08	6.4E-08	Liver	NA	NA	3.8E-02	3.8E-02
			RDX	NA	NA	3.1E-10	3.1E-10	Prostate	NA	NA	3.9E-06	3.9E-06
			Chemical Total	NA	NA	6.4E-08	6.4E-08		NA	NA	3.8E-02	3.8E-02
		Exposure Point Total					6.4E-08					3.8E-02
	Exposure Medium Total						6.4E-08					3.8E-02
Shallow Aquifer Groundwater Total							6.4E-08					3.8E-02
Receptor Total -Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							2.1E-06	Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				4.1E+00
Receptor Total - Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater							1.9E-06	Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater				1.1E+00
Receptor Total - Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							1.6E-06	Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				6.6E-01
Receptor Total - Soil* in Sludge Area and Cornwalis Cave Shallow Aquifer Groundwater							2.8E-07	Soil* in Sludge Area and Cornwalis Cave Shallow Aquifer Groundwater				7.1E-02

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

Soil* in Waste Area

Total Neurological/Central Nervous System HI Across All Media =	2.3E-01
Total Biliary/Liver HI Across All Media =	2.9E-02
Total Blood HI Across All Media =	3.0E-03
Total Immune System HI Across All Media =	1.2E+00
Total Skin HI Across All Media =	2.4E-02
Total Vascular HI Across All Media =	2.4E-02
Total Kidney HI Across All Media =	1.3E+00
Total Thyroid HI Across All Media =	4.1E-03
Total Gastrointestinal HI Across All Media =	1.3E+00
Total Hair HI Across All Media =	1.6E-02
Total Respiratory System HI Across All Media =	1.8E-05

Soil* in Across Site

Total Neurological/Central Nervous System HI Across All Media =	7.2E-02
Total Biliary/Liver HI Across All Media =	7.6E-03
Total Blood HI Across All Media =	4.9E-03
Total Immune System HI Across All Media =	3.2E-01
Total Whole Body HI Across All Media =	4.6E-03
Total Skin HI Across All Media =	1.4E-01
Total Vascular HI Across All Media =	1.4E-01
Total Kidney HI Across All Media =	2.1E-01
Total Thyroid HI Across All Media =	2.3E-03
Total Gastrointestinal HI Across All Media =	2.6E-01
Total Developmental HI Across All Media =	4.9E-03
Total Hair HI Across All Media =	8.9E-03
Total Respiratory System HI Across All Media =	1.5E-05

Soil* Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	2.8E-02
Total Blood HI Across All Media =	5.4E-03
Total Whole Body HI Across All Media =	5.4E-03
Total Skin HI Across All Media =	5.3E-01
Total Vascular HI Across All Media =	5.3E-01
Total Thyroid HI Across All Media =	2.5E-03
Total Gastrointestinal HI Across All Media =	3.9E-02
Total Developmental HI Across All Media =	6.4E-03
Total Hair HI Across All Media =	1.0E-02
Total Respiratory System HI Across All Media =	1.1E-05

Soil* in Sludge Area

Total Neurological/Central Nervous System HI Across All Media =	4.2E-03
Total Thyroid HI Across All Media =	7.0E-03
Total Gastrointestinal HI Across All Media =	2.0E-02

Cornwalis Cave Shallow Aquifer Groundwater

Total Liver HI Across All Media =	3.8E-02
Total Prostrate HI Across All Media =	3.9E-06

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	2.3E-07	NA	1.5E-07	3.8E-07	CNS, Blood, Biliary Tract	1.0E-03	NA	6.8E-04	1.7E-03
			Benzo(a)anthracene	1.1E-08	NA	9.2E-09	2.0E-08	NA	NA	NA	NA	0.0E+00
			Benzo(a)pyrene	1.0E-07	NA	8.8E-08	1.9E-07	NA	NA	NA	NA	0.0E+00
			Benzo(b)fluoranthene	1.4E-08	NA	1.2E-08	2.7E-08	NA	NA	NA	NA	0.0E+00
			Benzo(k)fluoranthene	1.2E-09	NA	1.0E-09	2.2E-09	NA	NA	NA	NA	0.0E+00
			Chrysene	1.3E-10	NA	1.1E-10	2.4E-10	NA	NA	NA	NA	0.0E+00
			n-Nitroso-di-n-propylamine	2.3E-07	NA	1.5E-07	3.8E-07	NA	NA	NA	NA	0.0E+00
			alpha-BHC	6.8E-07	NA	4.5E-07	1.1E-06	Liver	3.8E-05	NA	2.5E-05	6.3E-05
			Aroclor-1254	8.1E-06	NA	7.5E-06	1.6E-05	Ocular, Finger and Toe Nails	5.7E-01	NA	5.2E-01	1.1E+00
			Aroclor-1260	5.2E-07	NA	4.8E-07	9.9E-07	NA	NA	NA	NA	0.0E+00
			Dieldrin	2.2E-07	NA	1.5E-07	3.7E-07	Liver	7.8E-04	NA	5.1E-04	1.3E-03
			Heptachlor	2.2E-07	NA	1.5E-07	3.7E-07	Liver	2.7E-04	NA	1.8E-04	4.6E-04
			2,4,6-Trinitrotoluene	4.3E-08	NA	9.1E-09	5.2E-08	Liver	8.0E-03	NA	1.7E-03	9.7E-03
			Aluminum	NA	NA	NA	0.0E+00	Neurological	8.8E-02	NA	5.8E-03	9.4E-02
			Arsenic	1.5E-06	NA	3.0E-07	1.8E-06	Skin, Vascular	9.5E-03	NA	1.9E-03	1.1E-02
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	4.9E-01	NA	1.3E-01	6.2E-01
			Chromium	3.7E-06	NA	9.8E-06	1.4E-05	Not identified	6.9E-03	NA	1.8E-02	2.5E-02
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	1.7E-02	NA	1.1E-03	1.8E-02
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	1.3E-01	NA	8.3E-03	1.3E-01
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	1.5E-02	NA	9.9E-04	1.6E-02
			Manganese	NA	NA	NA	0.0E+00	CNS	5.2E-03	NA	3.4E-04	5.6E-03
			Vanadium	NA	NA	NA	0.0E+00	Hair	6.6E-03	NA	4.3E-04	7.0E-03
			Chemical Total	1.6E-05	NA	1.9E-05	3.5E-05		1.3E+00	NA	6.9E-01	2.0E+00
		Exposure Point Total					3.5E-05					2.0E+00
	Exposure Medium Total						3.5E-05					2.0E+00
	Air	Emissions from Soil* in Waste Area	Chromium	NA	1.1E-07	NA	1.1E-07	Respiratory System	NA	3.6E-05	NA	3.6E-05
			Chemical Total	NA	1.1E-07	NA	1.1E-07		NA	3.6E-05	NA	3.6E-05
		Exposure Point Total					1.1E-07					3.6E-05
	Exposure Medium Total						1.1E-07					3.6E-05
Soil* In Waste Area							3.5E-05					2.0E+00

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	2.3E-08	NA	1.5E-08	3.7E-08	CNS, Blood, Biliary Tract	1.0E-04	NA	6.7E-05	1.7E-04
			Benzo(a)anthracene	1.8E-08	NA	1.5E-08	3.3E-08	NA	NA	NA	NA	0.0E+00
			Benzo(a)pyrene	2.9E-07	NA	2.5E-07	5.4E-07	NA	NA	NA	NA	0.0E+00
			Benzo(b)fluoranthene	2.3E-08	NA	2.0E-08	4.3E-08	NA	NA	NA	NA	0.0E+00
			Benzo(k)fluoranthene	2.2E-09	NA	1.9E-09	4.0E-09	NA	NA	NA	NA	0.0E+00
			Chrysene	2.2E-10	NA	1.9E-10	4.1E-10	NA	NA	NA	NA	0.0E+00
			Dibenz(a,h)anthracene	1.1E-07	NA	9.8E-08	2.1E-07	NA	NA	NA	NA	0.0E+00
			Indeno(1,2,3-cd)pyrene	3.8E-08	NA	3.3E-08	7.1E-08	NA	NA	NA	NA	0.0E+00
			n-Nitroso-di-n-propylamine	2.3E-07	NA	1.5E-07	3.8E-07	NA	NA	NA	NA	0.0E+00
			alpha-BHC	8.6E-08	NA	5.7E-08	1.4E-07	Liver	4.8E-06	NA	3.2E-06	8.0E-06
			Aroclor-1254	2.2E-06	NA	2.1E-06	4.3E-06	Ocular, Finger and Toe Nails	1.6E-01	NA	1.4E-01	3.0E-01
			Aroclor-1260	1.5E-07	NA	1.4E-07	3.0E-07	NA	NA	NA	NA	0.0E+00
			Dieldrin	1.9E-08	NA	1.3E-08	3.2E-08	Liver	6.8E-05	NA	4.5E-05	1.1E-04
			Heptachlor	2.7E-08	NA	1.8E-08	4.4E-08	Liver	3.3E-05	NA	2.2E-05	5.5E-05
			2,4,6-Trinitrotoluene	1.4E-08	NA	3.0E-09	1.7E-08	Liver	2.6E-03	NA	5.5E-04	3.2E-03
			Aluminum	NA	NA	NA	0.0E+00	Neurological	2.6E-02	NA	1.7E-03	2.7E-02
			Antimony	NA	NA	NA	0.0E+00	Longevity, Blood	1.7E-03	NA	7.5E-04	2.4E-03
			Arsenic	8.7E-06	NA	1.7E-06	1.0E-05	Skin, Vascular	5.4E-02	NA	1.1E-02	6.5E-02
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	8.0E-02	NA	2.1E-02	1.0E-01
			Chromium	3.0E-06	NA	8.0E-06	1.1E-05	Not identified	5.6E-03	NA	1.5E-02	2.1E-02
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	9.3E-03	NA	6.2E-04	9.9E-03
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	2.2E-02	NA	1.5E-03	2.3E-02
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	1.6E-02	NA	1.1E-03	1.7E-02
			Manganese	NA	NA	NA	0.0E+00	CNS	1.7E-03	NA	1.1E-04	1.8E-03
			Mercury	NA	NA	NA	0.0E+00	Developmental, Neurological	2.0E-03	NA	1.3E-04	2.1E-03
			Vanadium	NA	NA	NA	0.0E+00	Hair	3.6E-03	NA	2.4E-04	3.9E-03
			Chemical Total	1.5E-05	0.0E+00	1.3E-05	2.8E-05		3.8E-01	0.0E+00	2.0E-01	5.8E-01
		Exposure Point Total					2.8E-05					5.8E-01
	Exposure Medium Total						2.8E-05					5.8E-01

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Air	Emissions from Soil* Across Site	Chromium	NA	8.7E-08	NA	8.7E-08	Respiratory System	NA	2.9E-05	NA	2.9E-05
			Chemical Total	NA	8.7E-08	NA	8.7E-08		NA	2.9E-05	NA	2.9E-05
		Exposure Point Total					8.7E-08					2.9E-05
	Exposure Medium Total						8.7E-08					2.9E-05
Soil* Across Site							2.8E-05					5.8E-01
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	1.8E-08	NA	1.6E-08	3.4E-08	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2.5E-07	NA	2.1E-07	4.6E-07	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2.5E-08	NA	2.1E-08	4.6E-08	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2.4E-09	NA	2.0E-09	4.4E-09	NA	NA	NA	NA	NA
			Chrysene	2.3E-10	NA	1.9E-10	4.2E-10	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	1.1E-07	NA	9.8E-08	2.1E-07	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	3.8E-08	NA	3.3E-08	7.1E-08	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	6.8E-03	NA	4.5E-04	7.3E-03
			Antimony	NA	NA	NA	NA	Longevity, Blood	1.9E-03	NA	8.2E-04	2.7E-03
			Arsenic	1.1E-05	NA	2.1E-06	1.3E-05	Skin, Vascular	6.7E-02	NA	1.3E-02	8.0E-02
			Chromium	2.4E-06	NA	6.3E-06	8.7E-06	Not identified	4.5E-03	NA	1.2E-02	1.6E-02
			Cobalt	NA	NA	NA	NA	Thyroid	9.1E-03	NA	6.0E-04	9.7E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	1.4E-02	NA	9.4E-04	1.5E-02
			Manganese	NA	NA	NA	NA	CNS	9.4E-04	NA	6.2E-05	1.0E-03
			Mercury	NA	NA	NA	NA	Developmental, Neurological	2.3E-03	NA	1.5E-04	2.5E-03
			Vanadium	NA	NA	NA	NA	Hair	3.7E-03	NA	2.4E-04	3.9E-03
			Chemical Total	1.4E-05	NA	8.8E-06	2.2E-05		1.1E-01	NA	2.8E-02	1.4E-01
		Exposure Point Total					2.2E-05					1.4E-01
	Exposure Medium Total						2.2E-05					1.4E-01
Soil* (continued)	Air	Emissions from Soil* Outside Waste Area	Chromium	NA	6.9E-08	NA	6.9E-08	Respiratory System	NA	2.3E-05	NA	2.3E-05
			Chemical Total	NA	6.9E-08	NA	6.9E-08		NA	2.3E-05	NA	2.3E-05
		Exposure Point Total					6.9E-08					2.3E-05
	Exposure Medium Total						6.9E-08					2.3E-05
Soil* Outside Waste Area							2.3E-05					1.4E-01

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Heptachlor epoxide	8.6E-07	NA	NA	8.6E-07	Liver	2.0E-02	NA	NA	2.0E-02
			RDX	6.8E-07	NA	NA	6.8E-07	Prostate	5.8E-03	NA	NA	5.8E-03
			Chemical Total	1.5E-06	NA	NA	1.5E-06		2.6E-02	NA	NA	2.6E-02
		Exposure Point Total					1.5E-06					2.6E-02
	Exposure Medium Total						1.5E-06					2.6E-02
Shallow Aquifer Groundwater Total							1.5E-06					2.6E-02
Groundwater	Groundwater	Yorktown-Eastover Deep Aquifer Tap Water	Heptachlor epoxide	3.1E-07	NA	NA	3.1E-07	Liver	7.4E-03	NA	NA	7.4E-03
			Manganese	NA	NA	NA	NA	CNS	4.6E-02	NA	NA	4.6E-02
			Chemical Total	3.1E-07	NA	NA	3.1E-07		5.3E-02	NA	NA	5.3E-02
		Exposure Point Total					3.1E-07					5.3E-02
	Exposure Medium Total						3.1E-07					5.3E-02
Deep Aquifer Groundwater Total							3.1E-07					5.3E-02
Receptor Total -Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							3.6E-05	Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				2.1E+00
Receptor Total -Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater							3.5E-05	Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater				2.1E+00
Receptor Total - Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater							2.9E-05	Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater				6.0E-01
Receptor Total - Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater							2.8E-05	Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater				6.3E-01
Receptor Total - Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							2.4E-05	Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				1.7E-01
Receptor Total - Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater							2.3E-05	Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater				1.9E-01

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

Soil* in Waste Area

Total Neurological/Central Nervous System HI Across All Media =	1.0E-01
Total Biliary/Liver HI Across All Media =	1.3E-02
Total Blood HI Across All Media =	1.7E-03
Total Ocular HI Across All Media =	1.1E+00
Total Finger and Toe Nails HI Across All Media =	1.1E+00
Total Skin HI Across All Media =	1.1E-02
Total Vascular HI Across All Media =	1.1E-02
Total Kidney HI Across All Media =	6.2E-01
Total Thyroid HI Across All Media =	1.8E-02
Total Gastrointestinal HI Across All Media =	1.5E-01
Total Hair HI Across All Media =	7.0E-03
Total Respiratory System HI Across All Media =	3.6E-05

Soil* in Across Site

Total Neurological/Central Nervous System HI Across All Media =	3.1E-02
Total Biliary/Liver HI Across All Media =	3.5E-03
Total Blood HI Across All Media =	2.6E-03
Total Ocular HI Across All Media =	3.0E-01
Total Finger and Toe Nails HI Across All Media =	3.0E-01
Total Longevity HI Across All Media =	2.4E-03
Total Skin HI Across All Media =	6.5E-02
Total Vascular HI Across All Media =	6.5E-02
Total Kidney HI Across All Media =	1.0E-01
Total Thyroid HI Across All Media =	9.9E-03
Total Gastrointestinal HI Across All Media =	4.1E-02
Total Developmental HI Across All Media =	2.1E-03
Total Hair HI Across All Media =	3.9E-03
Total Respiratory System HI Across All Media =	2.9E-05

Soil* Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	1.1E-02
Total Blood HI Across All Media =	2.7E-03
Total Longevity HI Across All Media =	2.7E-03
Total Skin HI Across All Media =	8.0E-02
Total Vascular HI Across All Media =	8.0E-02
Total Thyroid HI Across All Media =	9.7E-03
Total Gastrointestinal HI Across All Media =	1.5E-02
Total Developmental HI Across All Media =	2.5E-03
Total Hair HI Across All Media =	3.9E-03
Total Respiratory System HI Across All Media =	2.3E-05

Cornwalis Cave Shallow Aquifer Groundwater

Total Liver HI Across All Media =	2.0E-02
Total Prostrate HI Across All Media =	5.8E-03

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area										
			2,4-Dinitrotoluene	4.5E-08	NA	1.8E-08	6.4E-08	CNS, Blood, Biliary Tract	2.1E-04	NA	8.5E-05	3.0E-04
			Benzo(a)anthracene	2.1E-09	NA	1.1E-09	3.2E-09	NA	NA	NA	NA	0.0E+00
			Benzo(a)pyrene	2.0E-08	NA	1.1E-08	3.1E-08	NA	NA	NA	NA	0.0E+00
			Benzo(b)fluoranthene	2.9E-09	NA	1.5E-09	4.3E-09	NA	NA	NA	NA	0.0E+00
			Benzo(k)fluoranthene	2.3E-10	NA	1.2E-10	3.6E-10	NA	NA	NA	NA	0.0E+00
			Chrysene	2.5E-11	NA	1.3E-11	3.9E-11	NA	NA	NA	NA	0.0E+00
			n-Nitroso-di-n-propylamine	4.5E-08	NA	1.8E-08	6.4E-08	NA	NA	NA	NA	0.0E+00
			alpha-BHC	1.4E-07	NA	5.4E-08	1.9E-07	Liver	7.8E-06	NA	3.1E-06	1.1E-05
			Aroclor-1254	1.6E-06	NA	9.0E-07	2.5E-06	Ocular, Finger and Toe Nails	1.2E-01	NA	6.6E-02	1.8E-01
			Aroclor-1260	1.0E-07	NA	5.8E-08	1.6E-07	NA	NA	NA	NA	0.0E+00
			Dieldrin	4.4E-08	NA	1.8E-08	6.2E-08	Liver	1.6E-04	NA	6.5E-05	2.3E-04
			Heptachlor	4.4E-08	NA	1.8E-08	6.2E-08	Liver	5.7E-05	NA	2.3E-05	8.0E-05
			2,4,6-Trinitrotoluene	8.6E-09	NA	1.1E-09	9.7E-09	Liver	1.7E-03	NA	2.1E-04	1.9E-03
			Aluminum	NA	NA	NA	0.0E+00	Neurological	1.8E-02	NA	7.3E-04	1.9E-02
			Arsenic	3.0E-07	NA	3.6E-08	3.4E-07	Skin, Vascular	2.0E-03	NA	2.4E-04	2.2E-03
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	1.0E-01	NA	1.6E-02	1.2E-01
			Chromium	7.4E-07	NA	1.2E-06	1.9E-06	Not identified	1.4E-03	NA	2.3E-03	3.7E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	3.5E-03	NA	1.4E-04	3.6E-03
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	2.6E-02	NA	1.0E-03	2.7E-02
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	3.1E-03	NA	1.2E-04	3.2E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	1.1E-03	NA	4.3E-05	1.1E-03
			Vanadium	NA	NA	NA	0.0E+00	Hair	1.4E-03	NA	5.5E-05	1.4E-03
			Chemical Total	3.1E-06	NA	2.3E-06	5.4E-06		2.8E-01	NA	8.7E-02	3.7E-01
		Exposure Point Total					5.4E-06					3.7E-01
	Exposure Medium Total						5.4E-06					3.7E-01
	Air	Emissions from Soil* in Waste Area	Chromium	NA	1.1E-08	NA	1.1E-08	Respiratory System	NA	3.7E-06	NA	3.7E-06
			Chemical Total	NA	1.1E-08	NA	1.1E-08		NA	3.7E-06	NA	3.7E-06
		Exposure Point Total					1.1E-08					3.7E-06
	Exposure Medium Total						1.1E-08					3.7E-06
Soil* In Waste Area							5.4E-06					3.7E-01

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	4.5E-09	NA	1.8E-09	6.3E-09	CNS, Blood, Biliary Tract	2.1E-05	NA	8.4E-06	3.0E-05
			Benzo(a)anthracene	3.6E-09	NA	1.8E-09	5.4E-09	NA	NA	NA	NA	0.0E+00
			Benzo(a)pyrene	5.8E-08	NA	3.0E-08	8.8E-08	NA	NA	NA	NA	0.0E+00
			Benzo(b)fluoranthene	4.6E-09	NA	2.4E-09	6.9E-09	NA	NA	NA	NA	0.0E+00
			Benzo(k)fluoranthene	4.3E-10	NA	2.3E-10	6.6E-10	NA	NA	NA	NA	0.0E+00
			Chrysene	4.4E-11	NA	2.3E-11	6.6E-11	NA	NA	NA	NA	0.0E+00
			Dibenz(a,h)anthracene	2.3E-08	NA	1.2E-08	3.5E-08	NA	NA	NA	NA	0.0E+00
			Indeno(1,2,3-cd)pyrene	7.6E-09	NA	4.0E-09	1.2E-08	NA	NA	NA	NA	0.0E+00
			n-Nitroso-di-n-propylamine	4.5E-08	NA	1.8E-08	6.4E-08	NA	NA	NA	NA	0.0E+00
			alpha-BHC	1.7E-08	NA	6.9E-09	2.4E-08	Liver	1.0E-06	NA	4.0E-07	1.4E-06
			Aroclor-1254	4.4E-07	NA	2.5E-07	6.9E-07	Ocular, Finger and Toe Nails	3.2E-02	NA	1.8E-02	5.0E-02
			Aroclor-1260	3.1E-08	NA	1.7E-08	4.8E-08	NA	NA	NA	NA	0.0E+00
			Dieldrin	3.9E-09	NA	1.5E-09	5.4E-09	Liver	1.4E-05	NA	5.6E-06	2.0E-05
			Heptachlor	5.3E-09	NA	2.1E-09	7.4E-09	Liver	6.9E-06	NA	2.8E-06	9.6E-06
			2,4,6-Trinitrotoluene	2.8E-09	NA	3.6E-10	3.2E-09	Liver	5.5E-04	NA	7.0E-05	6.2E-04
			Aluminum	NA	NA	NA	0.0E+00	Neurological	5.3E-03	NA	2.1E-04	5.5E-03
			Antimony	NA	NA	NA	0.0E+00	Longevity, Blood	3.5E-04	NA	9.4E-05	4.5E-04
			Arsenic	1.7E-06	NA	2.1E-07	1.9E-06	Skin, Vascular	1.1E-02	NA	1.3E-03	1.3E-02
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	5.5E-02	NA	2.6E-03	5.8E-02
			Chromium	6.0E-07	NA	9.6E-07	1.6E-06	Not identified	1.2E-03	NA	1.9E-03	3.0E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	1.9E-03	NA	7.7E-05	2.0E-03
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	4.6E-03	NA	1.8E-04	4.8E-03
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	3.4E-03	NA	1.3E-04	3.5E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	3.5E-04	NA	1.4E-05	3.6E-04
			Mercury	NA	NA	NA	0.0E+00	Developmental, Neurological	4.2E-04	NA	1.7E-05	4.4E-04
			Vanadium	NA	NA	NA	0.0E+00	Hair	7.5E-04	NA	3.0E-05	7.8E-04
			Chemical Total	3.0E-06	NA	1.5E-06	4.5E-06		1.2E-01	NA	2.5E-02	1.4E-01
		Exposure Point Total					4.5E-06					1.4E-01
	Exposure Medium Total						4.5E-06					1.4E-01

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Air	Emissions from Soil* Across Site	Chromium	NA	8.7E-09	NA	8.7E-09	Respiratory System	NA	3.0E-06	NA	3.0E-06
			Chemical Total	NA	8.7E-09	NA	8.7E-09		NA	3.0E-06	NA	3.0E-06
		Exposure Point Total					8.7E-09					3.0E-06
	Exposure Medium Total						8.7E-09					3.0E-06
Soil* Across Site							4.5E-06					1.4E-01
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	3.7E-09	NA	1.9E-09	5.6E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	5.0E-08	NA	2.6E-08	7.6E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	4.9E-09	NA	2.5E-09	7.5E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	4.7E-10	NA	2.4E-10	7.2E-10	NA	NA	NA	NA	NA
			Chrysene	4.5E-11	NA	2.4E-11	6.9E-11	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	2.3E-08	NA	1.2E-08	3.5E-08	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	7.6E-09	NA	4.0E-09	1.2E-08	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	1.4E-03	NA	5.7E-05	1.5E-03
			Antimony	NA	NA	NA	NA	Longevity, Blood	3.9E-04	NA	1.0E-04	4.9E-04
			Arsenic	2.2E-06	NA	2.6E-07	2.4E-06	Skin, Vascular	1.4E-02	NA	1.7E-03	1.6E-02
			Chromium	4.8E-07	NA	7.6E-07	1.2E-06	Not identified	9.3E-04	NA	1.5E-03	2.4E-03
			Cobalt	NA	NA	NA	NA	Thyroid	1.9E-03	NA	7.6E-05	2.0E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	3.0E-03	NA	1.2E-04	3.1E-03
			Manganese	NA	NA	NA	NA	CNS	1.9E-04	NA	7.8E-06	2.0E-04
			Mercury	NA	NA	NA	NA	Developmental, Neurological	4.8E-04	NA	1.9E-05	5.0E-04
			Vanadium	NA	NA	NA	NA	Hair	7.7E-04	NA	3.1E-05	8.0E-04
			Chemical Total	2.7E-06	NA	1.1E-06	3.8E-06		2.3E-02	NA	3.6E-03	2.7E-02
		Exposure Point Total					3.8E-06					2.7E-02
	Exposure Medium Total						3.8E-06					2.7E-02
Soil* (continued)	Air	Emissions from Soil* Outside Waste Area	Chromium	NA	6.9E-09	NA	6.9E-09	Respiratory System	NA	2.4E-06	NA	2.4E-06
			Chemical Total	NA	6.9E-09	NA	6.9E-09		NA	2.4E-06	NA	2.4E-06
		Exposure Point Total					6.9E-09					2.4E-06
	Exposure Medium Total						6.9E-09					2.4E-06
Soil* Outside Waste Area							3.8E-06					2.7E-02

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Receptor Total -Soil* In Waste Area							5.4E-06	Receptor Total -Soil* In Waste Area				3.7E-01
Receptor Total - Soil* Across Site							4.5E-06	Receptor Total - Soil* Across Site				1.4E-01
Receptor Total - Soil* Outside Waste Area							3.8E-06	Receptor Total - Soil* Outside Waste Area				2.7E-02

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

Soil* in Waste Area

Total Neurological/Central Nervous System HI Across All Media =	2.0E-02
Total Biliary/Liver HI Across All Media =	2.5E-03
Total Blood HI Across All Media =	3.0E-04
Total Ocular HI Across All Media =	1.8E-01
Total Finger and Toe Nails HI Across All Media =	1.8E-01
Total Skin HI Across All Media =	2.2E-03
Total Vascular HI Across All Media =	2.2E-03
Total Kidney HI Across All Media =	1.2E-01
Total Thyroid HI Across All Media =	3.6E-03
Total Gastrointestinal HI Across All Media =	3.1E-02
Total Hair HI Across All Media =	1.4E-03
Total Respiratory System HI Across All Media =	3.7E-06

Soil* in Across Site

Total Neurological/Central Nervous System HI Across All Media =	6.3E-03
Total Biliary/Liver HI Across All Media =	6.8E-04
Total Blood HI Across All Media =	4.8E-04
Total Ocular HI Across All Media =	5.0E-02
Total Finger and Toe Nails HI Across All Media =	5.0E-02
Total Longevity HI Across All Media =	4.5E-04
Total Skin HI Across All Media =	1.3E-02
Total Vascular HI Across All Media =	1.3E-02
Total Kidney HI Across All Media =	5.8E-02
Total Thyroid HI Across All Media =	2.0E-03
Total Gastrointestinal HI Across All Media =	8.3E-03
Total Developmental HI Across All Media =	4.4E-04
Total Hair HI Across All Media =	7.8E-04
Total Respiratory System HI Across All Media =	3.0E-06

Soil* Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	2.2E-03
Total Blood HI Across All Media =	4.9E-04
Total Longevity HI Across All Media =	4.9E-04
Total Skin HI Across All Media =	1.6E-02
Total Vascular HI Across All Media =	1.6E-02
Total Thyroid HI Across All Media =	2.0E-03
Total Gastrointestinal HI Across All Media =	3.1E-03
Total Developmental HI Across All Media =	5.0E-04
Total Hair HI Across All Media =	8.0E-04
Total Respiratory System HI Across All Media =	2.4E-06

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	2.3E-08	NA	2.7E-08	5.0E-08	CNS, Blood, Biliary Tract	2.9E-04	NA	3.3E-04	6.3E-04
			Benzo(a)anthracene	1.1E-09	NA	1.6E-09	2.7E-09	NA	NA	NA	NA	0.0E+00
			Benzo(a)pyrene	1.0E-08	NA	1.6E-08	2.6E-08	NA	NA	NA	NA	0.0E+00
			Benzo(b)fluoranthene	1.5E-09	NA	2.2E-09	3.6E-09	NA	NA	NA	NA	0.0E+00
			Benzo(k)fluoranthene	1.2E-10	NA	1.8E-10	3.0E-10	NA	NA	NA	NA	0.0E+00
			Chrysene	1.3E-11	NA	1.9E-11	3.3E-11	NA	NA	NA	NA	0.0E+00
			n-Nitroso-di-n-propylamine	2.3E-08	NA	2.7E-08	5.0E-08	NA	NA	NA	NA	0.0E+00
			alpha-BHC	7.0E-08	NA	8.0E-08	1.5E-07	Liver	1.1E-05	NA	1.2E-05	2.3E-05
			Aroclor-1254	8.3E-07	NA	1.3E-06	2.2E-06	Ocular, Finger and Toe Nails	1.6E-01	NA	2.6E-01	4.2E-01
			Aroclor-1260	5.3E-08	NA	8.5E-08	1.4E-07	NA	NA	NA	NA	0.0E+00
			Dieldrin	2.3E-08	NA	2.6E-08	4.9E-08	Liver	2.2E-04	NA	2.5E-04	4.8E-04
			Heptachlor	2.3E-08	NA	2.6E-08	4.9E-08	Liver	7.8E-05	NA	8.9E-05	1.7E-04
			2,4,6-Trinitrotoluene	4.4E-09	NA	1.6E-09	6.0E-09	Liver	2.3E-03	NA	8.4E-04	3.1E-03
			Aluminum	NA	NA	NA	0.0E+00	Neurological	2.5E-02	NA	2.9E-03	2.8E-02
			Arsenic	1.6E-07	NA	5.3E-08	2.1E-07	Skin, Vascular	2.7E-03	NA	9.2E-04	3.6E-03
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	1.4E-01	NA	6.4E-02	2.0E-01
			Chromium	3.8E-07	NA	1.7E-06	2.1E-06	Not identified	2.0E-03	NA	9.0E-03	1.1E-02
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	4.8E-03	NA	5.5E-04	5.4E-03
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	3.6E-02	NA	4.1E-03	4.0E-02
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	4.3E-03	NA	4.9E-04	4.8E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	1.5E-03	NA	1.7E-04	1.7E-03
			Vanadium	NA	NA	NA	0.0E+00	Hair	1.9E-03	NA	2.1E-04	2.1E-03
			Chemical Total	1.6E-06	NA	3.4E-06	5.0E-06		3.8E-01	NA	3.4E-01	7.3E-01
		Exposure Point Total					5.0E-06					7.3E-01
	Exposure Medium Total						5.0E-06					7.3E-01
	Air	Emissions from Soil* in Waste Area	Chromium	NA	4.0E-09	NA	4.0E-09	Respiratory System	NA	3.7E-06	NA	3.7E-06
			Chemical Total	NA	4.0E-09	NA	4.0E-09		NA	3.7E-06	NA	3.7E-06
		Exposure Point Total					4.0E-09					3.7E-06
	Exposure Medium Total						4.0E-09					3.7E-06
Soil* In Waste Area							**5.0E-06**					**7.3E-01**

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	2.3E-09	NA	2.6E-09	5.0E-09	CNS, Blood, Biliary Tract	2.9E-05	NA	3.3E-05	6.2E-05
			Benzo(a)anthracene	1.8E-09	NA	2.7E-09	4.6E-09	NA	NA	NA	NA	0.0E+00
			Benzo(a)pyrene	3.0E-08	NA	4.4E-08	7.4E-08	NA	NA	NA	NA	0.0E+00
			Benzo(b)fluoranthene	2.4E-09	NA	3.5E-09	5.8E-09	NA	NA	NA	NA	0.0E+00
			Benzo(k)fluoranthene	2.2E-10	NA	3.3E-10	5.5E-10	NA	NA	NA	NA	0.0E+00
			Chrysene	2.2E-11	NA	3.3E-11	5.6E-11	NA	NA	NA	NA	0.0E+00
			Dibenz(a,h)anthracene	1.2E-08	NA	1.7E-08	2.9E-08	NA	NA	NA	NA	0.0E+00
			Indeno(1,2,3-cd)pyrene	3.9E-09	NA	5.8E-09	9.8E-09	NA	NA	NA	NA	0.0E+00
			n-Nitroso-di-n-propylamine	2.3E-08	NA	2.7E-08	5.0E-08	NA	NA	NA	NA	0.0E+00
			alpha-BHC	8.9E-09	NA	1.0E-08	1.9E-08	Liver	1.4E-06	NA	1.6E-06	2.9E-06
			Aroclor-1254	2.3E-07	NA	3.6E-07	5.9E-07	Ocular, Finger and Toe Nails	4.4E-02	NA	7.1E-02	1.2E-01
			Aroclor-1260	1.6E-08	NA	2.5E-08	4.1E-08	NA	NA	NA	NA	0.0E+00
			Dieldrin	2.0E-09	NA	2.3E-09	4.3E-09	Liver	1.9E-05	NA	2.2E-05	4.2E-05
			Heptachlor	2.7E-09	NA	3.1E-09	5.9E-09	Liver	9.5E-06	NA	1.1E-05	2.0E-05
			2,4,6-Trinitrotoluene	1.4E-09	NA	5.3E-10	2.0E-09	Liver	7.5E-04	NA	2.7E-04	1.0E-03
			Aluminum	NA	NA	NA	0.0E+00	Neurological	7.3E-03	NA	8.3E-04	8.1E-03
			Antimony	NA	NA	NA	0.0E+00	Longevity, Blood	4.8E-04	NA	3.7E-04	8.5E-04
			Arsenic	8.9E-07	NA	3.0E-07	1.2E-06	Skin, Vascular	1.5E-02	NA	5.3E-03	2.1E-02
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	7.6E-02	NA	1.0E-02	8.6E-02
			Chromium	3.1E-07	NA	1.4E-06	1.7E-06	Not identified	1.6E-03	NA	7.3E-03	9.0E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	2.7E-03	NA	3.0E-04	3.0E-03
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	6.3E-03	NA	7.2E-04	7.0E-03
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	4.6E-03	NA	5.3E-04	5.1E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	4.8E-04	NA	5.4E-05	5.3E-04
			Mercury	NA	NA	NA	0.0E+00	Developmental, Neurological	5.8E-04	NA	6.6E-05	6.4E-04
			Vanadium	NA	NA	NA	0.0E+00	Hair	1.0E-03	NA	1.2E-04	1.2E-03
			Chemical Total	1.5E-06	0.0E+00	2.2E-06	3.8E-06		1.6E-01	0.0E+00	9.7E-02	2.6E-01
		Exposure Point Total					3.8E-06					2.6E-01
	Exposure Medium Total						3.8E-06					2.6E-01

TABLE 9.10.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Air	Emissions from Soil* Across Site	Chromium	NA	3.3E-09	NA	3.3E-09	Respiratory System	NA	3.0E-06	NA	3.0E-06
			Chemical Total	NA	3.3E-09	NA	3.3E-09		NA	3.0E-06	NA	3.0E-06
		Exposure Point Total					3.3E-09					3.0E-06
	Exposure Medium Total						3.3E-09					3.0E-06
Soil* Across Site							3.8E-06					2.6E-01
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	1.9E-09	NA	2.8E-09	4.7E-09	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2.6E-08	NA	3.8E-08	6.4E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2.5E-09	NA	3.7E-09	6.3E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2.4E-10	NA	3.6E-10	6.0E-10	NA	NA	NA	NA	NA
			Chrysene	2.3E-11	NA	3.5E-11	5.8E-11	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	1.2E-08	NA	1.7E-08	2.9E-08	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	3.9E-09	NA	5.8E-09	9.8E-09	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	2.0E-03	NA	2.2E-04	2.2E-03
			Antimony	NA	NA	NA	NA	Longevity, Blood	5.3E-04	NA	4.0E-04	9.4E-04
			Arsenic	1.1E-06	NA	3.8E-07	1.5E-06	Skin, Vascular	1.9E-02	NA	6.6E-03	2.6E-02
			Chromium	2.5E-07	NA	1.1E-06	1.4E-06	Not identified	1.3E-03	NA	5.8E-03	7.1E-03
			Cobalt	NA	NA	NA	NA	Thyroid	2.6E-03	NA	2.9E-04	2.9E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	4.0E-03	NA	4.6E-04	4.5E-03
			Manganese	NA	NA	NA	NA	CNS	2.7E-04	NA	3.0E-05	3.0E-04
			Mercury	NA	NA	NA	NA	Developmental, Neurological	6.6E-04	NA	7.6E-05	7.4E-04
			Vanadium	NA	NA	NA	NA	Hair	1.1E-03	NA	1.2E-04	1.2E-03
			Chemical Total	1.4E-06	NA	1.6E-06	3.0E-06		3.2E-02	NA	1.4E-02	4.6E-02
		Exposure Point Total					3.0E-06					4.6E-02
	Exposure Medium Total						3.0E-06					4.6E-02
Soil* (continued)	Air	Emissions from Soil* Outside Waste Area	Chromium	NA	2.6E-09	NA	2.6E-09	Respiratory System	NA	2.4E-06	NA	2.4E-06
			Chemical Total	NA	2.6E-09	NA	2.6E-09		NA	2.4E-06	NA	2.4E-06
		Exposure Point Total					2.6E-09					2.4E-06
	Exposure Medium Total						2.6E-09					2.4E-06
Soil* Outside Waste Area							3.0E-06					4.6E-02

TABLE 9.10.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Receptor Total -Soil* In Waste Area							5.0E-06	Receptor Total -Soil* In Waste Area				7.3E-01
Receptor Total - Soil* Across Site							3.8E-06	Receptor Total - Soil* Across Site				2.6E-01
Receptor Total - Soil* Outside Waste Area							3.0E-06	Receptor Total - Soil* Outside Waste Area				4.6E-02

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

Soil* in Waste Area

Total Neurological/Central Nervous System HI Across All Media =	3.0E-02
Total Biliary/Liver HI Across All Media =	4.4E-03
Total Blood HI Across All Media =	6.3E-04
Total Ocular HI Across All Media =	4.2E-01
Total Finger and Toe Nails HI Across All Media =	4.2E-01
Total Skin HI Across All Media =	3.6E-03
Total Vascular HI Across All Media =	3.6E-03
Total Kidney HI Across All Media =	2.0E-01
Total Thyroid HI Across All Media =	5.4E-03
Total Gastrointestinal HI Across All Media =	4.5E-02
Total Hair HI Across All Media =	2.1E-03
Total Respiratory System HI Across All Media =	3.7E-06

Soil* in Across Site

Total Neurological/Central Nervous System HI Across All Media =	9.3E-03
Total Biliary/Liver HI Across All Media =	1.1E-03
Total Blood HI Across All Media =	9.2E-04
Total Ocular HI Across All Media =	1.2E-01
Total Finger and Toe Nails HI Across All Media =	1.2E-01
Total Longevity HI Across All Media =	8.5E-04
Total Skin HI Across All Media =	2.1E-02
Total Vascular HI Across All Media =	2.1E-02
Total Kidney HI Across All Media =	8.6E-02
Total Thyroid HI Across All Media =	3.0E-03
Total Gastrointestinal HI Across All Media =	1.2E-02
Total Developmental HI Across All Media =	6.4E-04
Total Hair HI Across All Media =	1.2E-03
Total Respiratory System HI Across All Media =	3.0E-06

Soil* Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	3.2E-03
Total Blood HI Across All Media =	9.4E-04
Total Longevity HI Across All Media =	9.4E-04
Total Skin HI Across All Media =	2.6E-02
Total Vascular HI Across All Media =	2.6E-02
Total Thyroid HI Across All Media =	2.9E-03
Total Gastrointestinal HI Across All Media =	4.5E-03
Total Developmental HI Across All Media =	7.4E-04
Total Hair HI Across All Media =	1.2E-03
Total Respiratory System HI Across All Media =	2.4E-06

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil in Waste Area	Benzo(a)pyrene	1.6E-08	NA	2.8E-09	1.9E-08	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	1.5E-09	NA	2.6E-10	1.8E-09	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	1.2E-10	NA	2.0E-11	1.4E-10	NA	NA	NA	NA	NA
			Aroclor-1254	6.5E-08	NA	1.2E-08	7.7E-08	Ocular, Finger and Toe Nails	1.3E-02	NA	2.3E-03	1.5E-02
			Aluminum	NA	NA	NA	NA	Neurological	3.9E-03	NA	5.1E-05	3.9E-03
			Arsenic	2.6E-07	NA	1.0E-08	2.8E-07	Skin, Vascular	4.6E-03	NA	1.8E-04	4.8E-03
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	3.4E-01	NA	1.8E-02	3.5E-01
			Chromium	3.6E-07	NA	1.9E-07	5.6E-07	Not identified	1.9E-03	NA	1.0E-03	2.9E-03
			Cobalt	NA	NA	NA	NA	Thyroid	4.9E-03	NA	6.5E-05	5.0E-03
			Iron	NA	NA	NA	NA	Gastrointestinal	4.6E-03	NA	6.0E-05	4.6E-03
			Chemical Total	7.1E-07	NA	2.2E-07	9.3E-07		3.7E-01	NA	2.1E-02	3.9E-01
		Exposure Point Total					9.3E-07					3.9E-01
	Exposure Medium Total						9.3E-07					3.9E-01
Surface Soil In Waste Area							9.3E-07					3.9E-01
Receptor Total - Surface Soil in Waste Area							9.3E-07	Receptor HI Total - Surface Soil in Waste Area				3.9E-01

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

	Surface Soil in Waste Area
Total Ocular HI Across All Media =	1.5E-02
Total Finger and Toe Nails HI Across All Media =	1.5E-02
Total Neurological/Central Nervous System HI Across All Media =	3.9E-03
Total Skin HI Across All Media =	4.8E-03
Total Vascular HI Across All Media =	4.8E-03
Total Kidney HI Across All Media =	3.5E-01
Total Thyroid HI Across All Media =	5.0E-03
Total Gastrointestinal HI Across All Media =	4.6E-03

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	NA	NA	NA	NA	CNS, Blood, Biliary Tract	4.8E-04	NA	5.5E-05	5.4E-04
			Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
			alpha-BHC	NA	NA	NA	NA	Liver	1.8E-05	NA	2.0E-06	2.0E-05
			Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	2.7E-01	NA	4.2E-02	3.1E-01
			Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dieldrin	NA	NA	NA	NA	Liver	3.6E-04	NA	4.2E-05	4.1E-04
			Heptachlor	NA	NA	NA	NA	Liver	1.3E-04	NA	1.5E-05	1.4E-04
			2,4,6-Trinitrotoluene	NA	NA	NA	NA	Liver	3.8E-03	NA	1.4E-04	3.9E-03
			Aluminum	NA	NA	NA	NA	Neurological	4.1E-02	NA	4.7E-04	4.2E-02
			Arsenic	NA	NA	NA	NA	Skin, Vascular	4.4E-03	NA	1.5E-04	4.6E-03
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	2.3E-01	NA	1.1E-02	2.4E-01
			Chromium	NA	NA	NA	NA	Not identified	3.2E-03	NA	1.5E-03	4.7E-03
			Cobalt	NA	NA	NA	NA	Thyroid	7.9E-03	NA	9.0E-05	8.0E-03
			Copper	NA	NA	NA	NA	Gastrointestinal	5.9E-02	NA	6.7E-04	6.0E-02
			Iron	NA	NA	NA	NA	Gastrointestinal	7.0E-03	NA	8.0E-05	7.1E-03
			Manganese	NA	NA	NA	NA	CNS	2.4E-03	NA	2.8E-05	2.5E-03
			Vanadium	NA	NA	NA	NA	Hair	3.1E-03	NA	3.5E-05	3.1E-03
			Chemical Total	NA	NA	NA	NA		6.3E-01	NA	5.6E-02	6.9E-01
		Exposure Point Total					NA					6.9E-01
	Exposure Medium Total						NA					6.9E-01
Soil* In Waste Area							NA					6.9E-01

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Eastover Deep Aquifer Tap Water	Heptachlor epoxide	NA	NA	NA	NA	Liver	9.7E-03	NA	1.4E-02	2.4E-02
			Manganese	NA	NA	NA	NA	CNS	6.0E-02	NA	4.9E-03	6.5E-02
			Chemical Total	NA	NA	NA	NA		7.0E-02	NA	1.9E-02	8.9E-02
		Exposure Point Total					NA					8.9E-02
	Exposure Medium Total						NA					8.9E-02
Deep Aquifer Groundwater Total							NA					8.9E-02
Receptor Total - Soil* in Waste Area and Yorktown Eastover Deep Aquifer Groundwater							NA				Receptor HI Total	7.7E-01

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

Soil* in Waste Area and Yorktown Eastover Deep Aquifer Groundwater

Total Ocular HI Across All Media =	3.1E-01
Total Finger and Toe Nails HI Across All Media =	3.1E-01
Total Neurological/Central Nervous System HI Across All Media =	1.1E-01
Total Skin HI Across All Media =	4.6E-03
Total Vascular HI Across All Media =	4.6E-03
Total Kidney HI Across All Media =	2.4E-01
Total Thyroid HI Across All Media =	8.0E-03
Total Gastrointestinal HI Across All Media =	6.7E-02
Total Blood HI Across All Media =	5.4E-04
Total Biliary Tract HI Across All Media =	5.4E-04
Total Liver HI Across All Media =	2.8E-02
Total Hair HI Across All Media =	3.1E-03

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDNECY EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	NA	NA	NA	NA	CNS, Blood, Biliary Tract	4.5E-03	NA	5.0E-04	5.0E-03
			Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
			alpha-BHC	NA	NA	NA	NA	Liver	1.6E-04	NA	1.8E-05	1.8E-04
			Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	2.5E+00	NA	3.9E-01	2.9E+00
			Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dieldrin	NA	NA	NA	NA	Liver	3.4E-03	NA	3.8E-04	3.8E-03
			Heptachlor	NA	NA	NA	NA	Liver	1.2E-03	NA	1.3E-04	1.3E-03
			2,4,6-Trinitrotoluene	NA	NA	NA	NA	Liver	3.5E-02	NA	1.3E-03	3.6E-02
			Aluminum	NA	NA	NA	NA	Neurological	3.8E-01	NA	4.3E-03	3.9E-01
			Arsenic	NA	NA	NA	NA	Skin, Vascular	4.1E-02	NA	1.4E-03	4.3E-02
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	2.2E+00	NA	9.6E-02	2.2E+00
			Chromium	NA	NA	NA	NA	Not identified	3.0E-02	NA	1.4E-02	4.4E-02
			Cobalt	NA	NA	NA	NA	Thyroid	7.4E-02	NA	8.2E-04	7.4E-02
			Copper	NA	NA	NA	NA	Gastrointestinal	5.5E-01	NA	6.2E-03	5.6E-01
			Iron	NA	NA	NA	NA	Gastrointestinal	6.5E-02	NA	7.3E-04	6.6E-02
			Manganese	NA	NA	NA	NA	CNS	2.3E-02	NA	2.5E-04	2.3E-02
			Vanadium	NA	NA	NA	NA	Hair	2.9E-02	NA	3.2E-04	2.9E-02
			Chemical Total	NA	NA	NA	NA		5.9E+00	NA	5.1E-01	6.4E+00
		Exposure Point Total					NA					6.4E+00
	Exposure Medium Total						NA					6.4E+00
Soil* In Waste Area							NA					**6.4E+00**

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA	Neurological	3.0E-02	NA	3.3E-04	3.0E-02
			Antimony	NA	NA	NA	NA	Longevity, Blood	8.1E-03	NA	6.1E-04	8.7E-03
			Arsenic	NA	NA	NA	NA	Skin, Vascular	2.9E-01	NA	9.9E-03	3.0E-01
			Chromium	NA	NA	NA	NA	Not identified	1.9E-02	NA	8.7E-03	2.8E-02
			Cobalt	NA	NA	NA	NA	Thyroid	4.0E-02	NA	4.5E-04	4.0E-02
			Iron	NA	NA	NA	NA	Gastrointestinal	6.2E-02	NA	6.9E-04	6.3E-02
			Manganese	NA	NA	NA	NA	CNS	4.1E-03	NA	4.6E-05	4.1E-03
			Mercury	NA	NA	NA	NA	Developmental, Neurological	1.0E-02	NA	1.1E-04	1.0E-02
			Vanadium	NA	NA	NA	NA	Hair	1.6E-02	NA	1.8E-04	1.6E-02
			Chemical Total	NA	NA	NA	NA		4.8E-01	NA	2.1E-02	5.0E-01
		Exposure Point Total					NA					5.0E-01
	Exposure Medium Total						NA					5.0E-01
Soil* Outside Waste Area							NA					5.0E-01

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDNECY EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	NA	NA	NA	NA	CNS, Blood, Biliary Tract	4.4E-04	NA	5.0E-05	4.9E-04
			Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
			alpha-BHC	NA	NA	NA	NA	Liver	2.1E-05	NA	2.4E-06	2.3E-05
			Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	6.8E-01	NA	1.1E-01	7.9E-01
			Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Dieldrin	NA	NA	NA	NA	Liver	3.0E-04	NA	3.3E-05	3.3E-04
			Heptachlor	NA	NA	NA	NA	Liver	1.4E-04	NA	1.6E-05	1.6E-04
			2,4,6-Trinitrotoluene	NA	NA	NA	NA	Liver	1.1E-02	NA	4.1E-04	1.2E-02
			Aluminum	NA	NA	NA	NA	Neurological	1.1E-01	NA	1.2E-03	1.1E-01
			Antimony	NA	NA	NA	NA	Longevity, Blood	7.4E-03	NA	5.5E-04	8.0E-03
			Arsenic	NA	NA	NA	NA	Skin, Vascular	2.4E-01	NA	7.9E-03	2.4E-01
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	3.5E-01	NA	1.6E-02	3.6E-01
			Chromium	NA	NA	NA	NA	Not identified	2.5E-02	NA	1.1E-02	3.6E-02
			Cobalt	NA	NA	NA	NA	Thyroid	4.1E-02	NA	4.6E-04	4.1E-02
			Copper	NA	NA	NA	NA	Gastrointestinal	9.6E-02	NA	1.1E-03	9.7E-02
			Iron	NA	NA	NA	NA	Gastrointestinal	7.1E-02	NA	7.9E-04	7.1E-02
			Manganese	NA	NA	NA	NA	CNS	7.3E-03	NA	8.2E-05	7.4E-03
			Mercury	NA	NA	NA	NA	Developmental, Neurological	8.8E-03	NA	9.9E-05	8.9E-03
			Vanadium	NA	NA	NA	NA	Hair	1.6E-02	NA	1.8E-04	1.6E-02
			Chemical Total	NA	NA	NA	NA		1.7E+00	NA	1.5E-01	1.8E+00
		Exposure Point Total					NA					1.8E+00
	Exposure Medium Total						NA					1.8E+00
Soil* Across Site							NA					1.8E+00

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Eastover Deep Aquifer Tap Water	Heptachlor epoxide	NA	NA	NA	NA	Liver	3.2E-02	NA	2.8E-02	6.0E-02
			Manganese	NA	NA	NA	NA	CNS	2.0E-01	NA	1.1E-02	2.1E-01
			Chemical Total	NA	NA	NA	NA		2.3E-01	NA	3.9E-02	2.7E-01
		Exposure Point Total					NA					2.7E-01
	Exposure Medium Total						NA					2.7E-01
Deep Aquifer Groundwater Total							NA					**2.7E-01**
Receptor Total -Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* In Waste Area and Yorktown Eastover Deep Aquifer Groundwater				6.7E+00
Receptor Total - Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* Outside Waste Area and Yorktown Eastover Deep Aquifer Groundwater				7.8E-01
Receptor Total - Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater							NA	Soil* Across Site and Yorktown Eastover Deep Aquifer Groundwater				2.1E+00

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

Soil* in Waste Area

Total Neurological/Central Nervous System HI Across All Media =	4.2E-01
Total Biliary/Liver HI Across All Media =	4.7E-02
Total Blood HI Across All Media =	5.0E-03
Total Ocular HI Across All Media =	2.9E+00
Total Finger and Toe Nails HI Across All Media =	2.9E+00
Total Skin HI Across All Media =	4.3E-02
Total Vascular HI Across All Media =	4.3E-02
Total Kidney HI Across All Media =	2.2E+00
Total Thyroid HI Across All Media =	7.4E-02
Total Gastrointestinal HI Across All Media =	6.2E-01
Total Hair HI Across All Media =	2.9E-02

Soil* Outside Waste Area

Total Neurological/Central Nervous System HI Across All Media =	4.4E-02
Total Blood HI Across All Media =	8.7E-03
Total Longevity HI Across All Media =	8.7E-03
Total Skin HI Across All Media =	3.0E-01
Total Vascular HI Across All Media =	3.0E-01
Total Thyroid HI Across All Media =	4.0E-02
Total Gastrointestinal HI Across All Media =	6.3E-02
Total Developmental HI Across All Media =	1.0E-02
Total Hair HI Across All Media =	1.6E-02

Soil* in Across Site

Total Neurological/Central Nervous System HI Across All Media =	1.3E-01
Total Biliary/Liver HI Across All Media =	1.3E-02
Total Blood HI Across All Media =	8.5E-03
Total Ocular HI Across All Media =	7.9E-01
Total Finger and Toe Nails HI Across All Media =	7.9E-01
Total Longevity HI Across All Media =	8.0E-03
Total Skin HI Across All Media =	2.4E-01
Total Vascular HI Across All Media =	2.4E-01
Total Kidney HI Across All Media =	3.6E-01
Total Thyroid HI Across All Media =	4.1E-02
Total Gastrointestinal HI Across All Media =	1.7E-01
Total Developmental HI Across All Media =	8.9E-03
Total Hair HI Across All Media =	1.6E-02

Yorktown Eastover Deep Aquifer Groundwater

Total Liver HI Across All Media =	6.0E-02
Total Neurological/Central Nervous System HI Across All Media =	2.1E-01

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDNECY EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	2.8E-07	NA	3.1E-08	3.1E-07		NA	NA	NA	NA
			Benzo(a)anthracene	6.6E-08	NA	1.2E-08	7.8E-08		NA	NA	NA	NA
			Benzo(a)pyrene	6.3E-07	NA	1.2E-07	7.4E-07		NA	NA	NA	NA
			Benzo(b)fluoranthene	8.8E-08	NA	1.6E-08	1.0E-07		NA	NA	NA	NA
			Benzo(k)fluoranthene	7.2E-09	NA	1.3E-09	8.6E-09		NA	NA	NA	NA
			Chrysene	7.8E-10	NA	1.5E-10	9.3E-10		NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	2.8E-07	NA	3.1E-08	3.1E-07		NA	NA	NA	NA
			alpha-BHC	8.3E-07	NA	9.3E-08	9.2E-07		NA	NA	NA	NA
			Aroclor-1254	9.9E-06	NA	1.6E-06	1.1E-05		NA	NA	NA	NA
			Aroclor-1260	6.3E-07	NA	9.9E-08	7.3E-07		NA	NA	NA	NA
			Dieldrin	2.7E-07	NA	3.0E-08	3.0E-07		NA	NA	NA	NA
			Heptachlor	2.7E-07	NA	3.0E-08	3.0E-07		NA	NA	NA	NA
			2,4,6-Trinitrotoluene	5.2E-08	NA	1.9E-09	5.4E-08		NA	NA	NA	NA
			Aluminum	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Arsenic	1.8E-06	NA	6.2E-08	1.9E-06		NA	NA	NA	NA
			Cadmium	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chromium	2.3E-05	NA	1.3E-05	3.6E-05		NA	NA	NA	NA
			Cobalt	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Copper	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Iron	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Manganese	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Vanadium	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chemical Total	3.8E-05	NA	1.5E-05	5.3E-05		NA	NA	NA	NA
		Exposure Point Total					5.3E-05					NA
	Exposure Medium Total						5.3E-05					NA
Soil*	Air	Emissions from Soil* in Waste Area	Chromium	NA	7.4E-07	NA	7.4E-07		NA	NA	NA	NA
			Chemical Total	NA	7.4E-07	NA	7.4E-07		NA	NA	NA	NA
		Exposure Point Total					7.4E-07					NA
	Exposure Medium Total						7.4E-07					NA
Soil* In Waste Area							5.4E-05					NA

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)anthracene	1.1E-07	NA	2.1E-08	1.3E-07		NA	NA	NA	NA
			Benzo(a)pyrene	1.5E-06	NA	2.9E-07	1.8E-06		NA	NA	NA	NA
			Benzo(b)fluoranthene	1.5E-07	NA	2.8E-08	1.8E-07		NA	NA	NA	NA
			Benzo(k)fluoranthene	1.5E-08	NA	2.7E-09	1.7E-08		NA	NA	NA	NA
			Chrysene	1.4E-09	NA	2.6E-10	1.7E-09		NA	NA	NA	NA
			Dibenz(a,h)anthracene	7.1E-07	NA	1.3E-07	8.4E-07		NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	2.4E-07	NA	4.4E-08	2.8E-07		NA	NA	NA	NA
			Aluminum	NA	NA	NA	NA		NA	NA	NA	NA
			Antimony	NA	NA	NA	NA		NA	NA	NA	NA
			Arsenic	1.3E-05	NA	4.4E-07	1.4E-05		NA	NA	NA	NA
			Chromium	1.5E-05	NA	8.4E-06	2.3E-05		NA	NA	NA	NA
			Cobalt	NA	NA	NA	NA		NA	NA	NA	NA
			Iron	NA	NA	NA	NA		NA	NA	NA	NA
			Manganese	NA	NA	NA	NA		NA	NA	NA	NA
			Mercury	NA	NA	NA	NA		NA	NA	NA	NA
			Vanadium	NA	NA	NA	NA		NA	NA	NA	NA
			Chemical Total	3.1E-05	NA	9.4E-06	4.0E-05		NA	NA	NA	NA
		Exposure Point Total					4.0E-05					NA
	Exposure Medium Total						4.0E-05					NA
Soil* Outside Waste Area							4.0E-05					NA

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDNECY EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Across Site	2,4-Dinitrotoluene	2.7E-08	NA	3.1E-09	3.0E-08		NA	NA	NA	NA
			Benzo(a)anthracene	1.1E-07	NA	2.0E-08	1.3E-07		NA	NA	NA	NA
			Benzo(a)pyrene	1.8E-06	NA	3.3E-07	2.1E-06		NA	NA	NA	NA
			Benzo(b)fluoranthene	1.4E-07	NA	2.6E-08	1.7E-07		NA	NA	NA	NA
			Benzo(k)fluoranthene	1.3E-08	NA	2.5E-09	1.6E-08		NA	NA	NA	NA
			Chrysene	1.3E-09	NA	2.5E-10	1.6E-09		NA	NA	NA	NA
			Dibenz(a,h)anthracene	7.1E-07	NA	1.3E-07	8.4E-07		NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	2.4E-07	NA	4.4E-08	2.8E-07		NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	2.8E-07	NA	3.1E-08	3.1E-07		NA	NA	NA	NA
			alpha-BHC	1.1E-07	NA	1.2E-08	1.2E-07		NA	NA	NA	NA
			Aroclor-1254	2.7E-06	NA	4.2E-07	3.1E-06		NA	NA	NA	NA
			Aroclor-1260	1.9E-07	NA	2.9E-08	2.2E-07		NA	NA	NA	NA
			Dieldrin	2.4E-08	NA	2.7E-09	2.6E-08		NA	NA	NA	NA
			Heptachlor	3.2E-08	NA	3.6E-09	3.6E-08		NA	NA	NA	NA
			2,4,6-Trinitrotoluene	1.7E-08	NA	6.1E-10	1.8E-08		NA	NA	NA	NA
			Aluminum	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Antimony	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Arsenic	1.1E-05	NA	3.6E-07	1.1E-05		NA	NA	NA	NA
			Cadmium	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chromium	1.9E-05	NA	1.1E-05	2.9E-05		NA	NA	NA	NA
			Cobalt	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Copper	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Iron	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Manganese	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Mercury	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Vanadium	NA	NA	NA	0.0E+00		NA	NA	NA	NA
			Chemical Total	3.5E-05	0.0E+00	1.2E-05	4.8E-05		NA	NA	NA	NA
		Exposure Point Total					4.8E-05					NA
	Exposure Medium Total						4.8E-05					NA
Soil* Across Site							4.8E-05					NA

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Heptachlor epoxide	1.3E-06	NA	2.2E-07	1.5E-06		NA	NA	NA	NA
			RDX	1.0E-06	NA	6.6E-08	1.1E-06		NA	NA	NA	NA
			Chemical Total	2.4E-06	0.0E+00	2.8E-07	2.6E-06		NA	NA	NA	NA
		Exposure Point Total					2.6E-06					NA
	Exposure Medium Total						2.6E-06					NA
Shallow Aquifer Groundwater Total							2.6E-06					NA
Receptor Total -Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							5.6E-05	Soil* In Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				NA
Receptor Total - Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							4.3E-05	Soil* Outside Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				NA
Receptor Total - Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater							5.0E-05	Soil* Across Site and Cornwalis Cave Shallow Aquifer Groundwater				NA

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area										
			2,4-Dinitrotoluene	4.6E-09	NA	4.5E-10	5.0E-09	CNS, Blood, Biliary Tract	5.2E-04	NA	5.1E-05	5.7E-04
			Benzo(a)anthracene	2.2E-10	NA	2.8E-11	2.4E-10	NA	NA	NA	NA	NA
			Benzo(a)pyrene	2.1E-09	NA	2.6E-10	2.3E-09	NA	NA	NA	NA	NA
			Benzo(b)fluoranthene	2.9E-10	NA	3.7E-11	3.3E-10	NA	NA	NA	NA	NA
			Benzo(k)fluoranthene	2.4E-11	NA	3.0E-12	2.7E-11	NA	NA	NA	NA	NA
			Chrysene	2.6E-12	NA	3.3E-13	2.9E-12	NA	NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	4.6E-09	NA	4.5E-10	5.0E-09	NA	NA	NA	NA	NA
			alpha-BHC	1.4E-08	NA	1.4E-09	1.5E-08	Liver	1.9E-05	NA	1.9E-06	2.1E-05
			Aroclor-1254	1.6E-07	NA	2.3E-08	1.9E-07	Immune System	1.9E-01	NA	2.6E-03	1.9E-01
			Aroclor-1260	1.0E-08	NA	1.4E-09	1.2E-08	NA	NA	NA	NA	NA
			Dieldrin	4.5E-09	NA	4.4E-10	4.9E-09	Liver	2.0E-04	NA	1.9E-05	2.2E-04
			Heptachlor	4.5E-09	NA	4.4E-10	4.9E-09	Liver	6.9E-04	NA	6.9E-05	7.6E-04
			2,4,6-Trinitrotoluene	8.7E-10	NA	2.7E-11	8.9E-10	Liver	4.0E-03	NA	1.3E-04	4.2E-03
			Aluminum	NA	NA	NA	0.0E+00	Neurological	4.4E-02	NA	4.4E-04	4.5E-02
			Arsenic	3.1E-08	NA	9.1E-10	3.2E-08	Skin, Vascular	4.8E-03	NA	1.4E-04	4.9E-03
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	2.5E-01	NA	9.8E-03	2.6E-01
			Chromium	7.5E-08	NA	3.0E-08	1.0E-07	Not identified	5.2E-04	NA	2.1E-04	7.3E-04
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	8.5E-04	NA	8.4E-06	8.6E-04
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	2.5E-01	NA	2.5E-03	2.6E-01
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	7.5E-03	NA	7.5E-05	7.6E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	2.6E-03	NA	2.6E-05	2.7E-03
			Vanadium	NA	NA	NA	0.0E+00	Hair	3.3E-03	NA	3.3E-05	3.4E-03
			Chemical Total	3.1E-07	NA	5.8E-08	3.7E-07		7.6E-01	NA	1.6E-02	7.8E-01
		Exposure Point Total					3.7E-07					7.8E-01
	Exposure Medium Total						3.7E-07					7.8E-01
Soil* In Waste Area							3.7E-07					7.8E-01

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Cornwalis Cave Shallow Aquifer Tap Water	Heptachlor epoxide	NA	NA	4.5E-08	4.5E-08	Liver	NA	NA	2.7E-02	2.7E-02
			RDX	NA	NA	2.0E-10	2.0E-10	Prostate	NA	NA	2.6E-06	2.6E-06
			Chemical Total	NA	NA	4.6E-08	4.6E-08		NA	NA	2.7E-02	2.7E-02
		Exposure Point Total					4.6E-08					2.7E-02
	Exposure Medium Total						4.6E-08					2.7E-02
Shallow Aquifer Groundwater Total							4.6E-08					2.7E-02
Receptor Total - Soil* in Waste Area and Cornwalis Cave Shallow Aquifer Groundwater							4.2E-07	HI Total - Soil* in Waste Area and Cornwalis Cave Shallow Aquifer Groundwater				8.1E-01

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

Soil* in Waste Area and Cornwalis Cave Shallow Aquifer Groundwater

Total Immune System HI Across All Media =	1.9E-01
Total Neurological/Central Nervous System HI Across All Media =	4.8E-02
Total Skin HI Across All Media =	4.9E-03
Total Vascular HI Across All Media =	4.9E-03
Total Kidney HI Across All Media =	2.6E-01
Total Thyroid HI Across All Media =	8.6E-04
Total Hair HI Across All Media =	3.4E-03
Total Gastrointestinal HI Across All Media =	2.6E-01
Total Blood HI Across All Media =	5.7E-04
Total Biliary Tract HI Across All Media =	5.7E-04
Total Liver HI Across All Media =	3.2E-02
Total Prostate HI Across All Media =	2.6E-06

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area										
			2,4-Dinitrotoluene	3.6E-08	NA	4.7E-09	4.1E-08	CNS, Blood, Biliary Tract	4.5E-04	NA	5.9E-05	5.1E-04
			Benzo(a)anthracene	1.7E-09	NA	2.9E-10	2.0E-09	NA	NA	NA	NA	0.0E+00
			Benzo(a)pyrene	1.6E-08	NA	2.8E-09	1.9E-08	NA	NA	NA	NA	0.0E+00
			Benzo(b)fluoranthene	2.3E-09	NA	3.9E-10	2.6E-09	NA	NA	NA	NA	0.0E+00
			Benzo(k)fluoranthene	1.9E-10	NA	3.2E-11	2.2E-10	NA	NA	NA	NA	0.0E+00
			Chrysene	2.0E-11	NA	3.5E-12	2.4E-11	NA	NA	NA	NA	0.0E+00
			n-Nitroso-di-n-propylamine	3.6E-08	NA	4.7E-09	4.1E-08	NA	NA	NA	NA	0.0E+00
			alpha-BHC	1.1E-07	NA	1.4E-08	1.2E-07	Liver	1.7E-05	NA	2.2E-06	1.9E-05
			Aroclor-1254	1.3E-06	NA	2.4E-07	1.5E-06	Ocular, Finger and Toe Nails	2.5E-01	NA	4.6E-02	2.9E-01
			Aroclor-1260	8.1E-08	NA	1.5E-08	9.6E-08	NA	NA	NA	NA	0.0E+00
			Dieldrin	3.5E-08	NA	4.6E-09	4.0E-08	Liver	3.4E-04	NA	4.5E-05	3.9E-04
			Heptachlor	3.5E-08	NA	4.6E-09	3.9E-08	Liver	1.2E-04	NA	1.6E-05	1.4E-04
			2,4,6-Trinitrotoluene	6.8E-09	NA	2.9E-10	7.1E-09	Liver	3.5E-03	NA	1.5E-04	3.7E-03
			Aluminum	NA	NA	NA	0.0E+00	Neurological	3.8E-02	NA	5.1E-04	3.9E-02
			Arsenic	2.4E-07	NA	9.5E-09	2.5E-07	Skin, Vascular	4.1E-03	NA	1.6E-04	4.3E-03
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	2.2E-01	NA	1.1E-02	2.3E-01
			Chromium	5.8E-07	NA	3.1E-07	8.9E-07	Not identified	3.0E-03	NA	1.6E-03	4.6E-03
			Cobalt	NA	NA	NA	0.0E+00	Thyroid	7.4E-03	NA	9.7E-05	7.5E-03
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	5.5E-02	NA	7.3E-04	5.6E-02
			Iron	NA	NA	NA	0.0E+00	Gastrointestinal	6.6E-03	NA	8.7E-05	6.6E-03
			Manganese	NA	NA	NA	0.0E+00	CNS	2.3E-03	NA	3.0E-05	2.3E-03
			Vanadium	NA	NA	NA	0.0E+00	Hair	2.9E-03	NA	3.8E-05	2.9E-03
			Chemical Total	2.5E-06	NA	6.1E-07	3.1E-06		5.9E-01	NA	6.1E-02	6.5E-01
		Exposure Point Total					3.1E-06					6.5E-01
	Exposure Medium Total						3.1E-06					6.5E-01
Soil* In Waste Area							3.1E-06					6.5E-01
Receptor Total							3.1E-06				Receptor HI Total	6.5E-01

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

Soil* in Waste Area

Total Neurological/Central Nervous System HI Across All Media =	4.2E-02
Total Liver HI Across All Media =	4.2E-03
Total Blood HI Across All Media =	5.1E-04
Total Biliary Tract HI Across All Media =	5.1E-04
Total Ocular HI Across All Media =	2.9E-01

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDNECY EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
											Total Finger and Toe Nails HI Across All Media =	2.9E-01
											Total Skin HI Across All Media =	4.3E-03
											Total Vascular HI Across All Media =	4.3E-03
											Total Kidney HI Across All Media =	2.3E-01
											Total Thyroid HI Across All Media =	7.5E-03
											Total Gastrointestinal HI Across All Media =	6.3E-02
											Total Hair HI Across All Media =	2.9E-03

TABLE 10.1.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil in Waste Area	Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	7.7E-01	NA	2.0E-01	9.7E-01
			Chemical Total	0.0E+00	NA	0.0E+00	0.0E+00		7.7E-01	NA	2.0E-01	9.7E-01
		Exposure Point Total					0.0E+00					9.7E-01
	Exposure Medium Total						0.0E+00					9.7E-01
Surface Soil In Waste Area							0.0E+00					9.7E-01
Receptor Total - Surface Soil In Waste Area							0.0E+00	Receptor Total - Surface Soil In Waste Area				9.7E-01

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

Surface Soil in Waste Area

Total Kidney HI Across All Media = 9.7E-01

TABLE 10.2.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	7.9E-01	NA	4.4E-01	1.2E+00
			Aluminum	NA	NA	NA	NA	Neurological	1.2E-01	NA	4.9E-03	1.3E-01
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	6.9E-01	NA	1.1E-01	8.0E-01
			Copper	NA	NA	NA	NA	Gastrointestinal	1.8E-01	NA	7.0E-03	1.8E-01
			Chemical Total	NA	NA	NA	NA		1.8E+00	NA	5.7E-01	2.3E+00
		Exposure Point Total					NA					2.3E+00
	Exposure Medium Total						NA					2.3E+00
Soil* In Waste Area							NA					2.3E+00
Receptor Total - Soil* in Waste Area							NA	Receptor HI Total - Soil* in Waste Area				2.3E+00

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

	Soil* in Waste Area
Total Ocular HI Across All Media =	1.2E+00
Total Finger and Toe Nails HI Across All Media =	1.2E+00
Total Neurological/Central Nervous System HI Across All Media =	1.3E-01
Total Kidney HI Across All Media =	8.0E-01
Total Gastrointestinal HI Across All Media =	1.8E-01

TABLE 10.3.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	7.4E+00	NA	2.9E+00	1.0E+01
			2,4,6-Trinitrotoluene	NA	NA	NA	NA	Liver	1.0E-01	NA	9.4E-03	1.1E-01
			Aluminum	NA	NA	NA	NA	Neurological	1.1E+00	NA	3.2E-02	1.2E+00
			Arsenic	NA	NA	NA	NA	Skin, Vascular	1.2E-01	NA	1.0E-02	1.3E-01
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	6.4E+00	NA	7.2E-01	7.2E+00
			Chromium	NA	NA	NA	NA	Not identified	9.0E-02	NA	1.0E-01	1.9E-01
			Cobalt	NA	NA	NA	NA	Thyroid	2.2E-01	NA	6.2E-03	2.3E-01
			Copper	NA	NA	NA	NA	Gastrointestinal	1.6E+00	NA	4.6E-02	1.7E+00
			Iron	NA	NA	NA	NA	Gastrointestinal	2.0E-01	NA	5.5E-03	2.0E-01
			Chemical Total	NA	NA	NA	NA		1.7E+01	NA	3.8E+00	2.1E+01
		Exposure Point Total					NA					2.1E+01
	Exposure Medium Total						NA					2.1E+01
Soil* In Waste Area							NA					2.1E+01
Soil*	Soil*	Soil* Across Site	Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	2.0E+00	NA	8.0E-01	2.8E+00
			Aluminum	NA	NA	NA	NA	Neurological	3.3E-01	NA	9.3E-03	3.4E-01
			Arsenic	NA	NA	NA	NA	Skin, Vascular	7.0E-01	NA	5.9E-02	7.6E-01
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	1.0E+00	NA	1.2E-01	1.2E+00
			Chromium	NA	NA	NA	NA	Not identified	7.4E-02	NA	8.3E-02	1.6E-01
			Cobalt	NA	NA	NA	NA	Thyroid	1.2E-01	NA	3.4E-03	1.3E-01
			Copper	NA	NA	NA	NA	Gastrointestinal	2.9E-01	NA	8.1E-03	3.0E-01
			Iron	NA	NA	NA	NA	Gastrointestinal	2.1E-01	NA	5.9E-03	2.2E-01
			Chemical Total	NA	NA	NA	NA		4.8E+00	NA	1.1E+00	5.9E+00
		Exposure Point Total					NA					5.9E+00
	Exposure Medium Total						NA					5.9E+00
Soil* Across Site							NA					5.9E+00

TABLE 10.3.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* Outside Waste Area	Arsenic	NA	NA	NA	NA	Skin, Vascular	8.8E-01	NA	7.4E-02	9.5E-01
			Chromium	NA	NA	NA	NA	Not identified	5.8E-02	NA	6.5E-02	1.2E-01
			Cobalt	NA	NA	NA	NA	Thyroid	1.2E-01	NA	3.3E-03	1.2E-01
			Iron	NA	NA	NA	NA	Gastrointestinal	1.9E-01	NA	5.2E-03	1.9E-01
			Chemical Total	NA	NA	NA	NA		1.2E+00	NA	1.5E-01	1.4E+00
		Exposure Point Total					NA					1.4E+00
	Exposure Medium Total						NA					1.4E+00
Soil* Outside Waste Area							NA					1.4E+00
Receptor Total -Soil* In Waste Area							NA	Soil* In Waste Area				2.1E+01
Receptor Total - Soil* Across Site							NA	Soil* Across Site				5.9E+00
Receptor Total - Soil* Outside Waste Area							NA	Soil* Outside Waste Area				1.4E+00

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable

Soil* in Waste Area

Total Ocular HI Across All Media =	1.0E+01
Total Finger and Toe Nails HI Across All Media =	1.0E+01
Total Neurological/Central Nervous System HI Across All Media =	1.2E+00
Total Skin HI Across All Media =	1.3E-01
Total Vascular HI Across All Media =	1.3E-01
Total Kidney HI Across All Media =	7.2E+00
Total Thyroid HI Across All Media =	2.3E-01
Total Gastrointestinal HI Across All Media =	1.9E+00
Total Liver HI Across All Media =	1.1E-01

Soil* Across Site

Total Ocular HI Across All Media =	2.8E+00
Total Finger and Toe Nails HI Across All Media =	2.8E+00
Total Neurological/Central Nervous System HI Across All Media =	3.4E-01
Total Skin HI Across All Media =	7.6E-01
Total Vascular HI Across All Media =	7.6E-01
Total Kidney HI Across All Media =	1.2E+00
Total Thyroid HI Across All Media =	1.3E-01
Total Gastrointestinal HI Across All Media =	5.1E-01

Soil* Outside Area

Total Skin HI Across All Media =	9.5E-01
Total Vascular HI Across All Media =	9.5E-01
Total Thyroid HI Across All Media =	1.2E-01
Total Gastrointestinal HI Across All Media =	1.9E-01

TABLE 10.4.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	2,4-Dinitrotoluene	1.0E-06	NA	3.2E-07	1.3E-06		NA	NA	NA	NA
			Benzo(a)pyrene	2.0E-06	NA	9.9E-07	3.0E-06		NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	1.0E-06	NA	3.2E-07	1.3E-06		NA	NA	NA	NA
			alpha-BHC	3.0E-06	NA	9.6E-07	4.0E-06		NA	NA	NA	NA
			Aroclor-1254	3.6E-05	NA	1.6E-05	5.2E-05		NA	NA	NA	NA
			Aroclor-1260	2.3E-06	NA	1.0E-06	3.3E-06		NA	NA	NA	NA
			Dieldrin	1.0E-06	NA	3.1E-07	1.3E-06		NA	NA	NA	NA
			Heptachlor	9.9E-07	NA	3.1E-07	1.3E-06		NA	NA	NA	NA
			Arsenic	6.8E-06	NA	6.5E-07	7.5E-06		NA	NA	NA	NA
			Chromium	7.1E-05	NA	1.1E-04	1.8E-04		NA	NA	NA	NA
			Chemical Total	1.3E-04	NA	1.3E-04	2.6E-04		NA	NA	NA	NA
		Exposure Point Total					2.6E-04					NA
	Exposure Medium Total						2.6E-04					NA
	Air	Emissions from Soil* in Waste Area	Chromium	NA	1.4E-06	NA	1.4E-06		NA	NA	NA	NA
			Chemical Total	NA	1.4E-06	NA	1.4E-06		NA	NA	NA	NA
		Exposure Point Total					1.4E-06					NA
	Exposure Medium Total						1.4E-06					NA
Soil* In Waste Area							2.6E-04					NA
Soil*	Soil*	Soil* Across Site	Benzo(a)pyrene	5.5E-06	NA	2.8E-06	8.4E-06		NA	NA	NA	NA
			Dibenz(a,h)anthracene	2.2E-06	NA	1.1E-06	3.3E-06		NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	7.3E-07	NA	3.7E-07	1.1E-06		NA	NA	NA	NA
			n-Nitroso-di-n-propylamine	1.0E-06	NA	3.2E-07	1.3E-06		NA	NA	NA	NA
			Aroclor-1254	1.0E-05	NA	4.4E-06	1.4E-05		NA	NA	NA	NA
			Arsenic	3.9E-05	NA	3.7E-06	4.3E-05		NA	NA	NA	NA
			Chromium	5.8E-05	NA	9.1E-05	1.5E-04		NA	NA	NA	NA
			Chemical Total	1.2E-04	NA	1.0E-04	2.2E-04		NA	NA	NA	NA
		Exposure Point Total					2.2E-04					NA
	Exposure Medium Total						2.2E-04					NA

TABLE 10.4.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Air	Emissions from Soil* Across Site	Chromium	NA	1.1E-06	NA	1.1E-06		NA	NA	NA	NA
			Chemical Total	NA	1.1E-06	NA	1.1E-06		NA	NA	NA	NA
		Exposure Point Total					1.1E-06					NA
	Exposure Medium Total						1.1E-06					NA
Soil* Across Site							2.2E-04					NA
Soil*	Soil*	Soil* Outside Waste Area	Benzo(a)pyrene	4.8E-06	NA	2.4E-06	7.2E-06		NA	NA	NA	NA
			Dibenz(a,h)anthracene	2.2E-06	NA	1.1E-06	3.3E-06		NA	NA	NA	NA
			Indeno(1,2,3-cd)pyrene	7.3E-07	NA	3.7E-07	1.1E-06		NA	NA	NA	NA
			Arsenic	4.8E-05	NA	4.6E-06	5.3E-05		NA	NA	NA	NA
			Chromium	4.6E-05	NA	7.2E-05	1.2E-04		NA	NA	NA	NA
			Chemical Total	1.0E-04	NA	8.0E-05	1.8E-04		NA	NA	NA	NA
		Exposure Point Total					1.8E-04					NA
	Exposure Medium Total						1.8E-04					NA
Soil* Outside Waste Area							1.8E-04					NA
Receptor Total -Soil* In Waste Area							2.6E-04	Soil* In Waste Area				NA
Receptor Total - Soil* Across Site							2.2E-04	Soil* Across Site				NA
Receptor Total - Soil* Outside Waste Area							1.8E-04	Soil* Outside Waste Area				NA

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

TABLE 10.5.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	Aroclor-1254					Immune System	9.1E-01	NA	2.6E-01	1.2E+00
			Aluminum					Neurological	2.1E-01	NA	4.4E-03	2.2E-01
			Cadmium					Proteinuria (Kidney)	1.2E+00	NA	9.8E-02	1.3E+00
			Copper					Gastrointestinal	1.2E+00	NA	2.5E-02	1.2E+00
			Chemical Total	0.0E+00	NA	0.0E+00	0.0E+00		3.5E+00	NA	3.9E-01	3.9E+00
		Exposure Point Total					0.0E+00					3.9E+00
	Exposure Medium Total						0.0E+00					3.9E+00
Soil* In Waste Area							**0.0E+00**					**3.9E+00**
Receptor Total - Soil* in Waste Area							0.0E+00				Receptor HI Total	3.9E+00

bold indicates soil area with greatest risk or hazard index

Soil* indicates combined surface and subsurface soil.

HI - Hazard Index

NA - Not applicable

CNS = Central Nervous System

	Soil* in Waste Area
Total Immune System HI Across All Media =	1.2E+00
Total Neurological/Central Nervous System HI Across All Media =	2.2E-01
Total Kidney HI Across All Media =	1.3E+00
Total Gastrointestinal HI Across All Media =	1.2E+00

TABLE 10.6.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	Aroclor-1254	8.1E-06	NA	7.5E-06	1.6E-05	Ocular, Finger and Toe Nails	5.7E-01	NA	5.2E-01	1.1E+00
			Cadmium	NA	NA	NA	0.0E+00	Proteinuria (Kidney)	4.9E-01	NA	1.3E-01	6.2E-01
			Copper	NA	NA	NA	0.0E+00	Gastrointestinal	1.3E-01	NA	8.3E-03	1.3E-01
			Chemical Total	8.1E-06	NA	7.5E-06	1.6E-05		1.2E+00	NA	6.6E-01	1.8E+00
		Exposure Point Total					1.6E-05					1.8E+00
	Exposure Medium Total						1.6E-05					1.8E+00
Soil* In Waste Area							1.6E-05					1.8E+00
Receptor Total -Soil* In Waste Area							1.6E-05				Soil* In Waste Area	1.8E+00

Soil* in Waste Area

Total Ocular HI Across All Media =	1.1E+00
Total Finger and Toe Nails HI Across All Media =	1.1E+00
Total Kidney HI Across All Media =	6.2E-01
Total Gastrointestinal HI Across All Media =	1.3E-01

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable
CNS = Central Nervous System

TABLE 10.1.CTE
RISK SUMMARY
CENTRAL TENDNECY EXPOSURE
Site 24, NWS Yorktown, Yorktown, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* in Waste Area	Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	2.5E+00	NA	3.9E-01	2.9E+00
			Aluminum	NA	NA	NA	NA	Neurological	3.8E-01	NA	4.3E-03	3.9E-01
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	2.2E+00	NA	9.6E-02	2.2E+00
			Copper	NA	NA	NA	NA	Gastrointestinal	5.5E-01	NA	6.2E-03	5.6E-01
			Chemical Total	NA	NA	NA	NA		5.6E+00	NA	5.0E-01	6.1E+00
		Exposure Point Total					NA					6.1E+00
	Exposure Medium Total						NA					6.1E+00
Soil* In Waste Area							NA					6.1E+00
Soil*	Soil*	Soil* Across Site	Aroclor-1254	NA	NA	NA	NA	Ocular, Finger and Toe Nails	6.8E-01	NA	1.1E-01	7.9E-01
			Aluminum	NA	NA	NA	NA	Neurological	1.1E-01	NA	1.2E-03	1.1E-01
			Arsenic	NA	NA	NA	NA	Skin, Vascular	2.4E-01	NA	7.9E-03	2.4E-01
			Cadmium	NA	NA	NA	NA	Proteinuria (Kidney)	3.5E-01	NA	1.6E-02	3.6E-01
			Chemical Total	NA	NA	NA	NA		1.4E+00	NA	1.3E-01	1.5E+00
		Exposure Point Total					NA					1.5E+00
	Exposure Medium Total						NA					1.5E+00
Soil* Across Site							NA					1.5E+00
Receptor Total - Soil* in Waste Area							NA	Receptor HI Total - Soil* in Waste Area				6.1E+00
Receptor Total - Soil* Across Site							NA	Receptor HI Total - Soil* Across Site				6.1E+00

Soil* indicates combined surface and subsurface soil.
HI - Hazard Index
NA - Not applicable

Soil* in Waste Area	
Total Ocular HI Across All Media =	2.9E+00
Total Finger and Toe Nails HI Across All Media =	2.9E+00
Total Neurological/Central Nervous System HI Across All Media =	3.9E-01
Total Kidney HI Across All Media =	2.2E+00
Total Gastrointestinal HI Across All Media =	5.6E-01

Soil* Across Site	
Total Ocular HI Across All Media =	7.9E-01
Total Finger and Toe Nails HI Across All Media =	7.9E-01
Total Neurological/Central Nervous System HI Across All Media =	1.1E-01
Total Skin HI Across All Media =	2.4E-01
Total Vascular HI Across All Media =	2.4E-01
Total Kidney HI Across All Media =	3.6E-01

Attachment 1
March 4, 2013 Response to Comment Document

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462
Tel 757-671-8311
Fax 757-497-6885

March 4, 2013

Mr. Moshood Oduwole
Federal Facility Remediation (3HS11)
USEPA Region 3
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Subject: Revised Response to Comments
Draft Final Remedial Investigation Report, Site 24
Naval Weapons Station Yorktown
Yorktown, Virginia

Dear Mr. Oduwole,

This letter provides revised responses to EPA's September 6, 2012 comments on the Draft Final Remedial Investigation Report, Site 24, includes a sampling and analysis plan for installation of one monitoring well (in place of a UFP-SAP Addendum), and offers notification that the completion of the final Site 24 RI Report will be put on hold until the results of sampling the new monitoring well are evaluated and incorporated into the final report.

Responses to EPA Comments

Three rounds of comments on the Site 24 RI Report were received by the EPA: in April, June, and September 2012. Response to Comment (RTC) letters were submitted following receipt of each round of comments. In addition, the WPNSTA Yorktown Partnering discussed these RTC letters during the August and November 2012 partnering meetings.

Due to the multiple rounds of comments and RTCs on the Site 24 RI, the RTC history for the unresolved comments are provided for clarity of the issue to be resolved by this letter.

Source of September 2012 EPA Comment #1

April 2012 EPA Technical Support Comment #5: *On page 3-3, Section 3.4.4 identifies that average groundwater flow to the York River, Felgates Creek, and Indian Field Creek as being 0.49 ft/day, 0.37 ft/day, and 1.2 ft/day, respectively. With these data and the distance to these water bodies the time it would take groundwater to reach each water body needs to be included in the text. In addition, calculate the time over which potentially contaminated groundwater has been discharging to these water bodies as well as identifying the respective groundwater discharge points to these three surface water bodies.*	April 2012 Response: No transport times were provided in the RI to these water bodies based on the results of the risk assessments that concluded there is no risk to human health or ecological receptors due to exposure to groundwater at the site. In addition, as stated in the responses to General Comments #3 and #5, the type of material encountered at Site 24 is not expected to leach into the groundwater at concentrations high enough to migrate to the nearby surface water bodies at concentrations posing risk.
June 2012 EPA Response to Technical Support	June 2012 Navy Response:

Comment 5: *Maximum contaminant concentrations (not mean) need to be used to assess risk to aquatic plants and invertebrates. Also, because groundwater may enter the surface water body through sediment, unfiltered data (i.e., total) need to be used. Based upon these criteria, there are a number of contaminants that are likely to enter the York River, Felgates Creek, and Indian Field Creek with concentrations that exceed the respective ecological screening values (ESVs) or with maximum detection limits (e.g. undetected) that exceed the respective ESVs. This potential for risk to aquatic receptors needs to be specifically identified in the conclusions. Because the exact locations of the TNT caches were not sampled, this supports the need to field verify risk to aquatic receptors in the three adjacent surface water bodies. The path forward would be to identify and sample the groundwater discharge areas in each surface water body to confirm whether, or not, ecological risk exists and to identify the area of that risk*	There are no direct exposures of ecological receptors to groundwater at the point the samples were collected (monitoring wells). The mean groundwater concentration better reflects the potential concentrations to which ecological receptors could actually be exposed upon discharge to a downgradient water body with the inclusion of appropriate dilution factors. As discussed in Section 7.5.3.3 of the ERA, dissolved metals data are most applicable from both a fate/transport and a bioavailability/exposure standpoint. Based upon the evaluation contained in the ERA, the Navy does not believe that the existing groundwater data show concentrations high enough to warrant further investigation for ecological receptors. In addition, while the exact locations of the caches cannot be identified (as presented in the May 2012 RTC letter), a review of historical site photographs (presented as Appendix A of the RI Report) indicate the presence of potential TNT caches (in the pre-1945 overhead photograph), not below the ground surface, as suggested by the EPA, but rather on the ground surface (see attached photograph). Therefore the analytical data from the surface and subsurface soil samples would be more representative of potential unreported releases and the Navy believes that the 37 surface and 43 subsurface soil samples collected throughout the site and evaluated in this RI are enough to adequately characterize the site. The RI report includes a copy of the pre-1945 photograph in Appendix A, and the text was updated to include a discussion of the surface storage of historical TNT caches at the site. No other changes were made to the RI report based on this comment.

September 2012 EPA Comment #1: *The response is unacceptable. Maximum groundwater concentrations should be compared to BTAG screening values as specified in the USEPA Guidance. Depending on contaminant fate and transport and groundwater flow characteristics, this comparison can be coupled with comparison with data from wells closest to the surface water bodies which may be indicative of groundwater quality at the point of discharge. The use of generic dilution factors is not acceptable.*

Navy Response: As requested, Table 1 (attached) presents the comparison of maximum groundwater concentrations at Site 24 to BTAG surface water screening concentrations. This table also presents a comparison of all Site 24 groundwater data, grouped by down gradient water body, to both BTAG surface water screening values and to the surface water Ecological Screening Values (ESVs) used in the Remedial Investigation (RI). Monitoring well locations are grouped to reflect radial groundwater flow from identified Site 24 waste areas and the nearest surface water body as follows:

- Monitoring wells GW09 and GW04 are approximately 400 feet and 600 feet down gradient from Waste Areas F and B, respectively and both are approximately 1200 feet upgradient from Felgates Creek.
- Monitoring wells GW01, GW03, GW05, GW06, and GW10 are approximately 200 to 600 feet down gradient from Site 24 Waste Areas C, E and F and approximately 600 to 1000 feet upgradient of the York River.
- Monitoring well GW07 is approximately 400 feet from Waste Area C and approximately 1600 feet from Indian Field Creek.

There is no ecological exposure to groundwater at these locations; therefore these data represent very conservative estimates of potential surface water exposures. Comparison of maximum groundwater concentrations and ecological screening values reveal that:

- Maximum detected concentrations of pesticides in groundwater did exceed both BTAG and ESV surface water criteria. However, the low detected concentrations of these pesticides do not appear to be related to a release of pesticides from the Site 24 waste areas; rather the concentrations appear to be more representative of historic pesticide application.
- Maximum detected concentrations of explosives and VOCs in groundwater did not exceed surface water ESVs.
- Maximum detected concentrations of barium and iron in groundwater did exceed the BTAG surface water screening levels, but did not exceed the ESVs. Further, the maximum detected concentration of barium did not exceed the Site 24 GW background barium concentration (118 ug/L). The maximum detected manganese groundwater concentration did not exceed the BTAG surface water screening criteria.

The low-level detected concentrations of chemicals presented on Table 1 are not indicative of releases from the waste areas. Therefore, given the characteristics of groundwater flow and transport, it is not likely that chemicals detected in monitoring wells will be expressed into the surface water bodies at concentrations of ecological concern. Sampling of surface water, sediment and porewater in Felgates Creek, York River, and Indian Field Creek is not recommended.

Source of September 2012 EPA Comment #2

April 2012 EPA Technical Support Comment #31:	April 2012 Response:
On page 7-20, Section 7.5.5.2 Aquatic Habitats indicates groundwater does not appear to be a significant transport medium for site-related constituents to the York River, Felgates Creek, or Indian Field Creek and site-related constituents that might reach these water bodies via groundwater would not appear to pose an unacceptable risk to aquatic biota. The text needs to adequately discuss the uncertainties of modeling contaminant concentrations from groundwater to surface water. The text also needs to adequately discuss the data gap, including uncertainty, which exists when sediment, pore water, and surface water samples were not collected from the three water bodies in areas where groundwater discharges to confirm the modeling used in the report.	Discussion has been added to the uncertainty section in regard to the groundwater evaluation. The direct screening of groundwater data is normally the first step in such an evaluation, with surface water, pore water, and/or sediment samples only collected from the receiving water body or bodies if the initial screening indicates the potential for significant transport and exposure from this pathway.

June 2012 EPA Response to Technical Support Comment 31: *The referenced changes to the uncertainty section will need to be reviewed. This review includes all areas where text changes to the report have been made. It would be helpful if a redlined version of these text changes would be transmitted for review.*	June 2012 Navy Response: A redlined version of the revised report has been provided with these comment responses.

September 2012 EPA Comment #2 (Response to Comment 4): *A review of the redlined draft RI (response to comment 4) resulted in the [four additional] comments [2a through 2d):*

September 2012 Navy Response: Responses to comments 2a through 2d are discussed below.

September 2012 EPA Comment #2a

April 2012 General Comment #3: *Area B reported the most extensive buried debris and the some of the highest concentrations of contaminants in subsurface soil; however, Figure 4-14, Shallow Groundwater Exceedance Results, shows that no monitoring wells were installed southeast of Area B. Therefore, the downgradient extent of Area B groundwater contamination has not been determined. This is a data gap that requires further investigation. Please revise the RI to identify the lack of groundwater data downgradient of Area B as a data gap, and clarify how this data gap will be addressed.*	April 2012 Response: While groundwater monitoring wells were not installed directly southeast of Burial Area B, hydropunch groundwater samples from locations east and southeast of Area B (A06HP01-01 and A06HP02-01) were collected and analyzed during the 1996 SSP (sample locations presented in Figure 4-2 and analytical data presented in Tables 5-19 and 5-20) and reviewed during development of the UFP-SAP. Since no organic constituents (VOCs, SVOCs, pesticides, PCBs, or explosives) were detected in groundwater, with the exception of delta-BHC in A06HP02-02 at an estimated concentration of 0.029 µg/L, the Navy believes there is no data gap and the extent of groundwater contamination south and southeast of Burial Area B has been determined. In addition, the type of material observed in Burial Area B (i.e., miscellaneous metal debris, inert debris) is not consistent with the compounds detected in the hydropunch samples. The groundwater elevation data collected during the June and November 2010 groundwater gauging events were re-evaluated with respect to potential groundwater flow directions. As a result, the groundwater near Burial Area B flows in a more southerly direction towards monitoring wells MW02 and MW08 (the revised Figure 4-14 is attached); reinforcing the Navy's belief that no data gap exists. No changes were made to the reports based on this comment with the exception of revising the groundwater flow contour map.
June 2012 EPA Response to General Comment 3: *First, it is unclear why there has been a change in the groundwater elevation contours generated for the site. The Response to Comments includes a revised Figure 3-*	June 2012 Navy Response: The RTCs submitted in May 2012 included a revised Figure 3-6 as this was where the groundwater contours for the site were first presented in the draft RI Report.

6, Shallow Groundwater Contour Map, rather than a revised Figure 4-14 as noted in the response. Figure 3-6 appears to include different groundwater elevation values for some of the site monitoring wells than were presented in the original Figure 3-6 of the RI Report. For example, the groundwater elevation at GW-06 in the revised Figure 3-6 is 13.82 feet; groundwater elevation at GW-03 is 13.73. The original Figure 3-6 in the RI Report reported groundwater elevations of 13.32 feet and 13.23 feet at GW-06 and GW-03, respectively. The Response to Comments does not provide the rationale or supporting lines of evidence for this change. Further, the response reports that, based on the re-evaluation of groundwater elevation data, "groundwater near Burial Area B flows in a more southerly direction towards monitoring wells MW02 and MW08." This statement is unsupported as the groundwater contours shown on the revised Figure 3-6 still support a southeasterly groundwater flow direction in the vicinity of Burial Area B. However, it is recognized that there is some uncertainty in this evaluation because there are no groundwater monitoring points east or southeast of Area B that would provide more definitive data on groundwater flow direction in this area of the site. This is an uncertainty that should be addressed, including whether the groundwater flow direction is influenced by temporal variations.	In the May 2012 RTCs, the inclusion of these contours on Figure 4-14 (the figure which was commented on) was inadvertently omitted from the response to the EPAs comment. Both Figure 3-6 and Figure 4-14 were revised to include the updated groundwater contours (see attached). In addition, the revised Figure 3-6 includes different groundwater elevations (for GW03 and GW06) than the draft RI because a further review of the groundwater contours presented in the draft RI Report (both Figures 3-6 and 4-14) showed that the groundwater elevations presented for these monitoring wells were incorrect. The elevations for GW03 and GW06 in Figure 3-6 of the draft RI report do not match the groundwater elevations presented Table 2-2 (Groundwater Elevations). Therefore, the figure included in the May 2012 RTCs included the correct groundwater elevations (recorded June 14, 2011).
The second issue of concern is that there are no groundwater data directly downgradient of Area B. The response indicates that hydropunch groundwater samples from locations east and southeast of Area B (A06HP01-01 and A06HP02-01) were collected and analyzed during the 1996 SSP. The sample locations are supposed to be presented in Figure 4-2 and analytical data in Tables 5-19 and 5-20. Hydropunch groundwater sample locations A06HP01-01 and A06HP02-01 could not be located on Figure 4-2 of the RI Report, so the applicability to Area B cannot be evaluated (Figure 4-2 in the RI Report is titled Extent of Buried Debris). Further, Tables 5-19 and 5-20 are not present in the RI Report. Section 1.3.2.3, 1994 SSP Field Activities, does discuss the installation often hydropunch samples at the site; however, data from these hydropunch samples have not been presented. It is also unclear if the data quality of the 1994 SSP samples is acceptable for purposes of the RI. There is also uncertainty with regards to the use of hydropunch data for use in risk-making decisions. Please provide a figure that identifies the locations of A06HP01-01 and A06HP02-01 in relation to Area B, and provide the analytical results from these locations. Please present an evaluation of	Regarding the EPA's comment about the hydropunch sample locations not being included on Figure 4-2 and Tables 5-19 and 5-20 not being included in the Report, this is correct. As stated in the original RTC to General Comment 3, the hydropunch samples were collected and analyzed in the 1996 SSP. Therefore, the references to Figure 4-2 and Tables 5-19 and 5-20 are to the figure and tables presented in the 1996 SSP, which is available in the Administrative Record. In order to determine the usability of the Site 24 (formerly SSA 6) hydropunch data collected in November 1994, the Work Plan for SSAs 1, 6, 7, and 15 (Baker, 1994) and the Final SSP Report for SSAs 1, 6, 7, and 15 (Baker, 1996) were reviewed. While the Navy cannot definitively say that the hydropunch data was validated because validation reports could not be located in the 1996 SSP Report, it is likely these data were validated for the following reasons: a) the Work Plan indicated that the hydropunch data would be validated by an independent validator according to Level C guidelines listed in the Naval Energy and Environmental Support Activity (NEESA) guidance document (NEESA 20.2-047B) and the USEPA Region III Modifications to the National Functional Guidelines; b) the data is used in a risk assessment; c) the qualifiers present in the data include only typical EPA Region 3 validation qualifiers (R, U, UJ, J, B, L, UL); and d) sample tracking sheets were included in Appendix E of the SSP Report (Baker, 1996) which track data to and from validation. Therefore, all hydropunch data excepting those with R-qualifiers is usable.

the data quality of these samples to determine their usability in the RI. If this additional information is not adequate to evaluate groundwater quality immediately downgradient of Area B, additional investigation of this area may be warranted, to include installation of a permanent monitoring well or wells to adequately characterize this area. This information could be collected in advance of any remedial alternative assessment to ensure that a groundwater specific remedy is not warranted.	Based in the information above, the organic constituent analytical results from the two hydropunch sample locations downgradient of Area B can be used to delineate the groundwater downgradient of Area B; therefore, a discussion of this data was added to Section 4.4 of the RI that indicates the only organic constituent that was detected above the selected screening criteria was delta-BHC. In addition, Figure 4-14 and Table 4-7 was revised to include the location and analytical results of these two hydropunch samples.

September 2012 EPA Comment 2a*: Section 4.4 indicates that groundwater samples " ... were not included in the quantitative risk assessments." Based upon a previous comment, this statement signifies a data gap, which will need to be resolved.*

Navy Response: The two samples referred to in Section 4.4, are hydropunch groundwater samples collected in 1994 and were therefore not included in the quantitative risk assessment but are identified in the RI because they provide groundwater quality information for the area downgradient of Area B. While the Navy does not consider the area downgradient of Area B a significant data gap, to address EPAs concern to better characterize groundwater associated with Area B, and as agreed to during the November 2012 Partnering Meeting, the Navy will install and sample one shallow monitoring well (YS24-MW11) downgradient of Area B (Figure 1). The details of the monitoring well installation and sampling and how the data will be evaluated are presented at the end of the RTCs. The RI will be revised to incorporate data from this well.

September 2012 EPA Comment #2b

April 2012 EPA Technical Support Comment #19:	April 2012 Response:
Section 7.2.3.4 on page 7-6 states that amphibians are typically selected as a receptor group only when freshwater aquatic or wetland habitats are present on, or in the contaminant transport pathways (as defined in the conceptual model) of a site. The section further states that this is not the case at Site 24 based upon the lack of these habitats. While amphibians need aquatic habitats to breed, many species feed in terrestrial areas (e.g., toads). Given the proximity of aquatic habitat in the area (nearby Felgates and Indian Field Creeks), Site 24 is likely used by amphibians for feeding. This use should be recognized. BTAG agrees with the approach to evaluate potential risks to reptiles and amphibians from food web exposures using other fauna (birds and mammals) as surrogates.	Potential use of the site by the more terrestrially-orientated amphibians in areas close to fresh water bodies was added to the text but a formal assessment endpoint was not added for this receptor group because most nearby water bodies are brackish to saline.

September 2012 EPA Comment 2b: *Section 7.2.3.4 (page 7-6) and Section 7.6 (page 7-23): The conclusion of not adding a " ... formal assessment endpoint. .. " for amphibians is not supported by the text, is incorrect, and needs to be included.*

Navy Response: The Navy's May 16, 2012 response letter indicated that "*more terrestrially orientated amphibians in areas close to fresh water bodies was added to the text but a formal assessment endpoint was not added for this receptor group because most nearby water bodies are brackish to saline*". In the

June 1, 2012 response, the EPA responded "*While BTAG is willing to accept this approach for this site, future investigations should do a more thorough assessment of nearby habitat for potential amphibian use instead of assuming 'most nearby water bodies are brackish to saline.'……*". During the November 2012 Partnering Meeting, the WPNSTA Yorktown Partnering team agreed that future investigations at WPNSTA Yorktown will include a more formal assessment of habitats to determine potential ecological receptors. No further change to the RI text will be made.

September 2012 EPA Comment #2c

April 2012 EPA Technical Support Comment #5: *On page 3-3, Section 3.4.4 identifies that average groundwater flow to the York River, Felgates Creek, and Indian Field Creek as being 0.49 ft/day, 0.37 ft/day, and 1.2 ft/day, respectively. With these data and the distance to these water bodies the time it would take groundwater to reach each water body needs to be included in the text. In addition, calculate the time over which potentially contaminated groundwater has been discharging to these water bodies as well as identifying the respective groundwater discharge points to these three surface water bodies.*	April 2012 Response: No transport times were provided in the RI to these water bodies based on the results of the risk assessments that concluded there is no risk to human health or ecological receptors due to exposure to groundwater at the site. In addition, as stated in the responses to General Comments #3 and #5, the type of material encountered at Site 24 is not expected to leach into the groundwater at concentrations high enough to migrate to the nearby surface water bodies at concentrations posing risk.
June 2012 EPA Response to Technical Support Comment 5: *Maximum contaminant concentrations (not mean) need to be used to assess risk to aquatic plants and invertebrates. Also, because groundwater may enter the surface water body through sediment, unfiltered data (i.e., total) need to be used. Based upon these criteria, there are a number of contaminants that are likely to enter the York River, Felgates Creek, and Indian Field Creek with concentrations that exceed the respective ecological screening values (ESVs) or with maximum detection limits (e.g. undetected) that exceed the respective ESVs. This potential for risk to aquatic receptors needs to be specifically identified in the conclusions. Because the exact locations of the TNT caches were not sampled, this supports the need to field verify risk to aquatic receptors in the three adjacent surface water bodies. The path forward would be to identify and sample the groundwater discharge areas in each surface water body to confirm whether, or not, ecological risk exists and to identify the area of that risk*	June 2012 Navy Response: There are no direct exposures of ecological receptors to groundwater at the point the samples were collected (monitoring wells). The mean groundwater concentration better reflects the potential concentrations to which ecological receptors could actually be exposed upon discharge to a downgradient water body with the inclusion of appropriate dilution factors. As discussed in Section 7.5.3.3 of the ERA, dissolved metals data are most applicable from both a fate/transport and a bioavailability/exposure standpoint. Based upon the evaluation contained in the ERA, the Navy does not believe that the existing groundwater data show concentrations high enough to warrant further investigation for ecological receptors. In addition, while the exact locations of the caches cannot be identified (as presented in the May 2012 RTC letter), a review of historical site photographs (presented as Appendix A of the RI Report) indicate the presence of potential TNT caches (in the pre-1945 overhead photograph), not below the ground surface, as suggested by the EPA, but rather on the ground surface (see attached photograph). Therefore the analytical data from the surface and subsurface soil samples would be more representative of potential unreported releases and the Navy believes that the 37 surface and 43 subsurface soil samples collected throughout the site and evaluated in this RI are enough

	to adequately characterize the site. The RI report includes a copy of the pre-1945 photograph in Appendix A, and the text was updated to include a discussion of the surface storage of historical TNT caches at the site. No other changes were made to the RI report based on this comment.

September 2012 EPA Comment 2c: *Sections 7.5.3.3 and 7.6: The maximum concentration of contaminants in groundwater needs to be used instead of the mean concentrations to assess (estimate) ecological risk.*

Navy Response: As discussed and agreed to in the November 2012 partnering meeting, the RI sections 7.5.3.3 and 7.6 do not need to be revised to include the use of maximum concentrations in groundwater for comparison to BTAG screening values. However, this comparison has been conducted, as discussed in the response to Comment #1 in this RTC letter and in Table 1. This comparison shows the low-level detected concentrations of chemicals are not indicative of releases from the waste areas. Given the characteristics of groundwater flow and transport, it is not likely that chemicals detected in monitoring wells will be expressed into the surface water bodies at concentrations of ecological concern.

September 2012 EPA Comment #2d

April 2012 EPA Technical Support Comment #27:	April 2012 Response:
On page 7-13, Section 7.5.2 identifies frequency of detection as an additional factor for Step 3a. Because contaminant concentrations can be highly variable, by orders of magnitude, this does not support the use of frequency of detection as meaningful. This approach confuses frequency of detection with frequency of exposure. Eliminating contaminants as COPCs if they occur in less than 5% of samples provided at least 20 samples have been collected does not seem reasonable. The argument could be made that this one sample is a hot spot. Another argument that can be made is that the remaining samples were taken outside the area of contamination, and therefore outside of the "site". Frequency of detection should be used to help characterize the exposure, not to eliminate a contaminant from consideration.	Frequency of detection was used as line of evidence but was not used as the sole basis to eliminate a chemical. The magnitude of any screening value exceedances was also considered concurrent with frequency of detection; the "hot spot" part of the comment is specifically addressed in the existing text.

September 2012 EPA Comment 2d: *Section 7.5.2: The use of frequency of detection as a valid criterion for establishing COPCs or COCs is not appropriate because of the variability between contaminant concentrations and the limited number of samples (e.g., three). Frequency of detect is often also not valid to the distribution of the samples and the spatial extent of the area of contamination.*

Navy Response: Based upon EPA guidance and Navy ERA guidance, frequency of detection can be used as a criterion during Step 3A COPC selection if a sufficient number of samples are available. As indicated in Section 7.5.2, the minimum number of samples that must be available (based upon EPA guidance) for this criterion to be considered is 20. Also, as indicated in Section 7.5.2, this criterion is not applied in an "absolute" manner; other factors, such as the magnitude of any screening value exceedances, are also considered concurrently. In terms of the Site 24 ERA, few sample groupings had a sufficient number of

available samples for this criterion to apply and no constituent was screened out based solely upon this criterion. This information is included in the ERA. The EPA (including BTAG) agreed with and accepted this response during the November 2012 Partnering Meeting.

Proposed Monitoring Well Sampling Plan

As agreed to by the WPNSTA Yorktown Partnering Team, during the November 2012 Partnering Meeting, one shallow (<30 feet) monitoring well will be installed (YS24-MW11) within the Columbia Aquifer to characterize groundwater quality downgradient of Area B, (Figure 1). Details of the new monitoring well installation and sampling plan are presented herein and take the place of a formal UFP-SAP. The Navy acknowledges that approval of these RTCs represent approval of the new well installation and this sampling plan.

The WPNSTA Yorktown team agreed during the November 2012 Partnering Meeting that following monitoring well installation and development, one groundwater sample will be collected in July 2013 (seasonally consistent with site groundwater data) from this new monitoring well. Although the WPNSTA Yorktown team considered limiting the groundwater sampling to the analytes listed in Table 1, the Navy will analyze the groundwater sample for full suite (VOCs, SVOCs, pesticides, PCBs, explosives, and total/dissolved metals), as outlined in the Site 24 UFP-SAP (CH2MHILL, 2010).

Other site monitoring wells will not be re-sampled as discussed and agreed to during the November 2012 partnering meeting where it was agreed that one round of sampling for each monitoring well was adequate for this site (CH2M HILL, 2012).

Field Activities

Prior to installation of the new monitoring well at Site 24, utility clearances will be performed by Miss Utility of Virginia and a third party utility clearance subcontractor. Utilities in the vicinity of the new monitoring well will be marked. If the proposed monitoring well is located within 5 feet of a marked utility it will be relocated and the field team will use their best judgment in relocating the well and notify the PM of its new location.

Soil samples from the borehole will be collected for lithologic characterization in accordance with USCS standards and field screening will be conducted using a PID as the borehole is advanced. Soil samples will be collected continuously from the ground surface to the final depth of the borehole using split-spoon sampling.

The monitoring well will be installed using a 4.25-inch inside diameter (ID) hollow stem auger drilling methods, will be constructed of 2-inch ID Schedule-40 polyvinyl chloride (PVC) pipe, and installed at a maximum depth of 30 feet. The monitoring well screens will be machine-slotted, 0.010-inch PVC.

A silica filter pack will be placed around the annular space of the well screen from the bottom of the boring extending to a depth of 2 feet above the top of the screen. A 2-foot bentonite layer will be placed above the top of the sand pack. After the bentonite has been hydrated, a cement –bentonite grout will be placed in the remaining annular space. The monitoring well will be completed as a stick-up with a steel cover. A locking watertight cap will be placed on the PVC pipe and the well clearly marked. Four cement bollards will be installed around the well for protection.

Following installation, the monitoring well will be developed by the drilling subcontractor using a submersible pump and using a combination of surging and pumping throughout the well screen. During

monitoring well development, CH2M HIILL will measure water quality parameters including pH, oxidation reduction potential (ORP), temperature, conductivity, turbidity, and dissolved oxygen (DO) with a water quality meter. The water quality parameters will be recorded in the field notebook approximately every five minutes. In addition, the water quality meter will be calibrated prior to development activities and recorded in the field notebook. At least three well volumes of water will be removed, in addition to the amount of water added during the installation process. Development will continue until the water is relatively clear and free of sediment or until two hours of development have passed, whichever comes first. Development information, including turbidity, pH, specific conductivity, temperature, and gallons removed will be recorded in the field logbook.

Following monitoring well installation and development, and prior to the start of groundwater sampling, the depth to groundwater, to the nearest 0.01 foot, will be measured from all monitoring wells at Site 24. Measurements will be made from the lip of the PVC riser, which will be marked with an indelible marker. If during removal of the locking well cap, the well demonstrates signs of being under pressure (escaping air sounds, cap being pushed off by pressure), then the depth to water in that monitoring well will not be measured for a period of one hour in order to allow for the water level to equilibrate. Depth to water and time measured will be recorded in the field logbook. The newly-installed monitoring well will then be sampled using a low-flow sampling technique and submergible pump, in accordance with the SOP entitled, *Low-Flow Groundwater Sampling from Monitoring Wells* (CH2M HILL, 2010). Following sample collection, the groundwater sample will be shipped to GPL Laboratories and analyze for VOCs, SVOCs, pesticides, PCBs, explosives, and total/dissolved metals.

All non-disposable sampling equipment will be decontaminated before and immediately after each use. Equipment will be decontaminated with Liquinox® (or equivalent solution) and allowed to dry between each use. The water level indicator will be scrubbed with deionized water between each measurement. All decontamination liquids will be containerized and handled according to the investigation-derived waste (IDW) Handling section below. Disposable equipment (e.g., tubing for low-flow sampling, filters, paper towels, disposable PPE) will be disposed as solid waste.

Heavy equipment such as drill rig equipment (augers, rods or split spoons) will be steam-cleaned before use at the new monitoring well location. A decontamination pad will be set up onsite to prevent runoff of the decontamination water and to allow easy collection of decontamination fluids into a 55-gallon drum and treatment as IDW.

All IDW generated during this project is anticipated and assumed to be non-hazardous; however, it will be fully characterized in order to ensure it is transported and disposed of in accordance with all pertinent regulations.

The IDW generated during monitoring well installation and sampling will be soil cuttings, monitoring well development water, purge water, and solutions used to decontaminate non-disposable sampling equipment. Solid and aqueous IDW will be containerized separately in Department of Transportation-approved 55-gallon drums.

One composite soil sample and one composite groundwater sample will be collected for the purpose of IDW characterization, and will be analyzed for full TCLP, ignitability, corrosivity, and reactivity analyses. All drums will be removed from the site within 90 days of generation (with Navy approval).

Disposable equipment, including PPE and paper towels, will be disposed as solid waste.

Following sample collection, the new monitoring well will be horizontally and vertically located by a Virginia licensed surveyor. The surveyor will provide coordinates of all horizontal points X, Y, to the nearest 0.5 feet and vertical point Z to the nearest 0.01 foot (0.1 foot for unpaved ground surface elevations).

Data Evaluation

The laboratory data report will include a Contract Laboratory Program (CLP) Level IV – equivalent package. Following receipt of the analytical results, the data will be validated by CH2M HILL using the procedures in Worksheet #36 of the UFP-SAP (CH2M HILL, 2010). Validated groundwater analytical results will be compared to the most recent version(s) of the groundwater project action limits (PALs) listed in the Site 24 UFP-SAP (Federal MCLs, the USEPA RSLs for Tap Water, and Marine surface water ESVs) (CH2M HILL, 2010) and the marine surface water BTAG screening values (see the response to Comment #2b above regarding determining ecological habitats). Data evaluation will include the following decision metrics:

- If sample results from YS24-MW11 are below the PALs and BTAG screening levels then the RI report will conclude that groundwater downgradient of Area B poses no unacceptable risk to ecological receptors
- If sample results from YS24-MW11 exceed either the PALs or BTAG screening levels then the Navy in consultation with EPA and VDEQ will consider the implication of those exceedances on potential risk and path forward to incorporate conclusions into the RI and path forward for the site.

Please provide acceptance of these responses, the proposed sampling plan, and the putting the completion of the final Site 24 RI Report on hold until the results of the monitoring well sampling have been evaluated by April 3, 2013.

Once the RTCs have been finalized the Navy anticipates the following next steps:

1. Install new monitoring well immediately downgradient of Area B
2. Sample new monitoring well in July 2013
3. Incorporate new well data into the revised draft final RI report;
4. Submit the revised draft final RI showing track changes
5. Finalize RI report, assuming that the nature and concentrations of the constituents do not pose an unacceptable risk.

Please feel free to contact me should you have any additional questions.

Sincerely,

CH2M HILL

Stephanie Sawyer
Project Manager

cc: Mr. Wade Smith/VDEQ
Mr. James Gravette/NAVFAC Midlant
Mr. Bill Friedmann/CH2M HILL
Ms. Laura Cook/CH2M HILL
Ms. Mary Anderson/CH2M HILL

References:

CH2M HILL. 2010. *Site 24 Remedial Investigation Work Plan, Naval Weapons Station Yorktown, Yorktown, Virginia.*

CH2M HILL. 2012. *Final November 7 and 8, 2011 Partnering Meeting Minutes, WPNSTA Yorktown Partnering Team*. November.

Attachments:

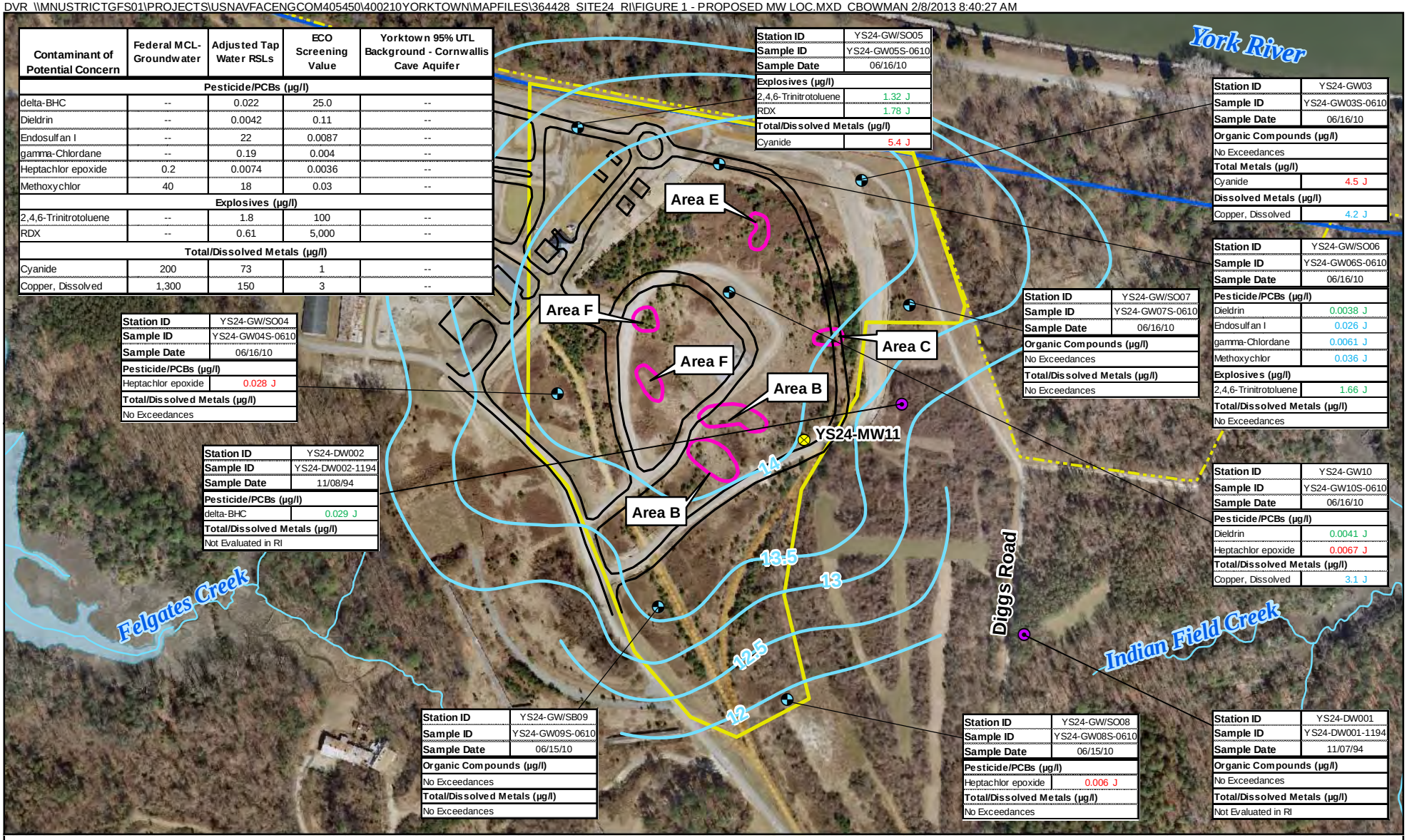
Table 1
Figure 1
June 1, 2012 EPA Comments

Table 1
Groundwater Exceecances of BTAG and RI Screening Values
Yorktown Site 24
Yorktown, VA

Chemical	BTAG Screening Value	ESV used in RI	Max positvie detects		YS24-GW/SB09	YS24-GW/SO04	YS24-GW01	YS24-GW03		YS24-GW/SO05	YS24-GW/SO06	YS24-GW10	YS24-GW02	YS24-GW/SO07	YS24-GW/SO08
					YS24-GW09S-0610	YS24-GW04S-0610	YS24-GW01D-0610	YS24-GW03S-0610	YS24-GW03SP-0610	YS24-GW05S-0610	YS24-GW06S-0610	YS24-GW10S-0610	YS24-GW02D-0610	YS24-GW07S-0610	YS24-GW08S-0610
					06/15/10	06/16/10	06/15/10	06/16/10	06/16/10	06/16/10	06/16/10	06/16/10	06/15/10	06/16/10	06/15/10
					Felgates	Felgates	York	York	York	York	York	York	Indian Field	Indian Field	Indian Field
Inorganics (UG/L)															
Barium	4.00	200	28.9	J	200 U	**18.2 J**	**35.1 J**	**15.5 J**	**15.6 J**	**19.2 J**	**20.1 J**	**17.1 J**	**28.9 J**	200 U	**20.9 J**
Cyanide	1.00	1.00	5.4	J	10 U	10 U	10 U	10 U	**4.5 J**	**5.4 J**	10 U	10 U	10 U	10 U	10 U
Iron	300	1000	541		**16.8 J**	100 U	**541**	100 U	100 U	100 U	100 U	50.3 B	**238**	100 U	**178**
Manganese	120	100	113		**4.9 J**	7 B	**113**	1.3 B	1.4 B	1.6 B	13.6 B	**27.8**	**18.4**	3.3 B	**15.4**
Pesticide/Polychlorinated Biphenyls (UG/L)															
beta-BHC	NSV	25.0	0.018	J	0.05 U	0.028 B	0.018 B	0.043 B	0.032 B	0.05 U	0.05 U	0.02 B	**0.018 J**	0.026 B	0.05 U
Endosulfan I	0.051	0.0087	0.084	J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.026 J**	**0.0056 J**	**0.084 J**	0.05 U	0.05 U
gamma-Chlordane	0.0022	0.004	0.0061	J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.0061 J**	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.0019	0.0036	0.028	J	0.05 U	**0.028 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.0067 J**	**0.0098 J**	0.05 U	**0.006 J**
Methoxychlor	0.03	0.03	0.036	J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.036 J**	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Organic Compounds (UG/L)															
m- and p-Xylene	NSV	19.0	0.13	J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**0.13 J**	1 U	1 U
o-Xylene	NSV	19.0	0.06	J	0.5 U	0.5 U	**0.038 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.06 J**	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	NSV	NSV	1		0.5 U	0.5 U	0.5 U	**1.0**	**1.0**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Explosives (UG/L)															
1,3,5-Trinitrobenzene	NSV	15.00	1.18	J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**1.18 J**	2.5 U	2.5 U	2.5 U	2.5 U
4-Amino-2,6-dinitrotoluene	NSV	19	0.782	J	5 U	5 U	5 U	5 U	5 U	5 U	**0.782 J**	5 U	5 U	5 U	5 U

Notes:
Bold indicates detections

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\364428_SITE24_RI\FIGURE 1 - PROPOSED MW LOC.MXD CBOWMAN 2/8/2013 8:40:27 AM



Contaminant of Potential Concern	Federal MCL-Groundwater	Adjusted Tap Water RSLs	ECO Screening Value	Yorktown 95% UTL Background - Cornwallis Cave Aquifer
Pesticide/PCBs (µg/l)				
delta-BHC	--	0.022	25.0	--
Dieldrin	--	0.0042	0.11	--
Endosulfan I	--	22	0.0087	--
gamma-Chlordane	--	0.19	0.004	--
Heptachlor epoxide	0.2	0.0074	0.0036	--
Methoxychlor	40	18	0.03	--
Explosives (µg/l)				
2,4,6-Trinitrotoluene	--	1.8	100	--
RDX	--	0.61	5,000	--
Total/Dissolved Metals (µg/l)				
Cyanide	200	73	1	--
Copper, Dissolved	1,300	150	3	--

Station ID	YS24-GW/SO05
Sample ID	YS24-GW05S-0610
Sample Date	06/16/10
Explosives (µg/l)	
2,4,6-Trinitrotoluene	1.32 J
RDX	1.78 J
Total/Dissolved Metals (µg/l)	
Cyanide	5.4 J

Station ID	YS24-GW03
Sample ID	YS24-GW03S-0610
Sample Date	06/16/10
Organic Compounds (µg/l)	
No Exceedances	
Total Metals (µg/l)	
Cyanide	4.5 J
Dissolved Metals (µg/l)	
Copper, Dissolved	4.2 J

Station ID	YS24-GW/SO06
Sample ID	YS24-GW06S-0610
Sample Date	06/16/10
Pesticide/PCBs (µg/l)	
Dieldrin	0.0038 J
Endosulfan I	0.026 J
gamma-Chlordane	0.0061 J
Methoxychlor	0.036 J
Explosives (µg/l)	
2,4,6-Trinitrotoluene	1.66 J
Total/Dissolved Metals (µg/l)	
No Exceedances	

Station ID	YS24-GW/SO07
Sample ID	YS24-GW07S-0610
Sample Date	06/16/10
Organic Compounds (µg/l)	
No Exceedances	
Total/Dissolved Metals (µg/l)	
No Exceedances	

Station ID	YS24-GW/SO04
Sample ID	YS24-GW04S-0610
Sample Date	06/16/10
Pesticide/PCBs (µg/l)	
Heptachlor epoxide	0.028 J
Total/Dissolved Metals (µg/l)	
No Exceedances	

Station ID	YS24-DW002
Sample ID	YS24-DW002-1194
Sample Date	11/08/94
Pesticide/PCBs (µg/l)	
delta-BHC	0.029 J
Total/Dissolved Metals (µg/l)	
Not Evaluated in RI	

Station ID	YS24-GW10
Sample ID	YS24-GW10S-0610
Sample Date	06/16/10
Pesticide/PCBs (µg/l)	
Dieldrin	0.0041 J
Heptachlor epoxide	0.0067 J
Total/Dissolved Metals (µg/l)	
Copper, Dissolved	3.1 J

Station ID	YS24-GW/SB09
Sample ID	YS24-GW09S-0610
Sample Date	06/15/10
Organic Compounds (µg/l)	
No Exceedances	
Total/Dissolved Metals (µg/l)	
No Exceedances	

Station ID	YS24-GW/SO08
Sample ID	YS24-GW08S-0610
Sample Date	06/15/10
Pesticide/PCBs (µg/l)	
Heptachlor epoxide	0.006 J
Total/Dissolved Metals (µg/l)	
No Exceedances	

Station ID	YS24-DW001
Sample ID	YS24-DW001-1194
Sample Date	11/07/94
Organic Compounds (µg/l)	
No Exceedances	
Total/Dissolved Metals (µg/l)	
Not Evaluated in RI	

Legend

- Hydropunch Sample
- Monitoring Well
- Proposed Monitoring Well
- Fences
- Groundwater Contour
- JIEDDO Battle Course
- Yorktown Base Boundary
- Waste Areas
- Site 24, the Aviation Field, Investigation Area (former SSA 6 Helicopter Landing Pad)

Concentrations shaded in GREEN exceed RSLs

Concentrations shaded in BLUE exceed Eco Screening Values

Concentrations shaded in RED exceed RSLs and Eco Screening Values

N W E S

0 200 400 Feet

Figure 1
Shallow Groundwater Exceedance Results
Site 24 Remedial Investigation Report
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL